GUAM AND CNMI MILITARY RELOCATION 2012 ROADMAP ADJUSTMENTS

Live-Fire Training Range Complex Alternatives Analysis Report

PRE-FINAL

DEPARTMENT OF THE NAVY
Naval Facilities Engineering Command, Pacific
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

JUNE 2013

THIS PAGE INTENTIONALLY LEFT BLANK

GUAM LIVE-FIRE TRAINING RANGE COMPLEX
ALTERNATIVES ANALYSIS REPORT

PRE-FINAL

PREPARED FOR:

Joint Guam Program Office, Washington, D.C.

PREPARED BY:

Naval Facilities Engineering Command, Pacific

Contract Number N62742-11-D-1801

Task Order 0005

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

Appendices

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

AAFB	Andersen Air Force Base
ac	acre
ADNL	A-weighted Day-Night Level
AGL	Above Ground Level
APZ	Accident Potential Zone
ATC	Air Traffic Control
BTS	Brown Tree Snake
CCN	Category Code Number
CDNL	C-weighted day/night average sound level
CDP	Conceptual Development Plan
CFR	Code of Federal Regulations
CNMI	Commonwealth of the Northern Mariana Islands
Comm	Communication
dB	decibel
DoD	Department of Defense
ECP	Entry Control Point
EOD	Explosive Ordinance Disposal
ESA	Endangered Species Act
ESQD	Explosives Safety Quantity Distance
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FOUO	For Official Use Only
ft	foot
ft^2	square foot
FY	Fiscal Year
gal	gallon
GIS	Geographic Information System
GovGuam	Government of Guam
GPA	Guam Power Authority
GWA	Guam Waterworks Authority
ha	hectare
ID	Identification
IOC	Initial Operational Capability
IT	Information Technology
JGPO	Joint Guam Program Office
JTE	Joint Threat Emitter
KD	Known Distance
kg	kilograms
kV	kilovolt
kVA	kilovolt ampere
kW	kilowatt
L	liter
lbs	pounds
LCC	Life Cycle Cost
LCCA	Life Cycle Cost Analysis
LFTRC	Live-Fire Training Range Complex
LUPZ	Land Use Planning Zone
LZ/DZ	Landing Zone/Drop Zone
m	meter

m^2	square meter
m^3	cubic meter
MARFORPAC	U.S. Marine Forces Pacific
MCO	Marine Corps Order
MEC	Munitions and Explosives of Concern
mm	millimeter
MOUT	Military Operations in Urban Terrain
MPMG	Multi-Purpose Machine Gun
MRF	Modified Record of Fire
Mt.	Mount
NAVFACPAC	Naval Facilities Engineering Command Pacific
NAVFIG	Naval Flight Information Group
NCTS	Naval Computer and Telecommunications Station
NEPA	National Environmental Policy Act
NEW	Net Explosive Weight
NMS	Naval Munitions Site
NRHP	National Register of Historic Places
NSSA	Non-Standard Small Arms
NWF	Northwest Field
PRTC	Pacific Regional Training Center
PSDZ	Probabilistic Surface Danger Zone
RA	Restricted Area
RAICUZ	Range Air Installations Compatible Use Zones
RCF	Range Control Facility
RED HORSE	Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers
ROD	Record of Decision
SACON	Shock Absorbing Concrete
SDZ	Surface Danger Zone
SEIS	Supplemental Environmental Impact Statement
SNCO	Staff Non-Commissioned Officer
SOGCN	Species of Greatest Conservation Need
TECOM	Marine Corps Training and Education Command
THAAD	Theater High Altitude Air Defense
U.S.	United States
UFC	Unified Facilities Criteria
UFW	Unaccounted for Water
USAPHC	U.S. Army Public Health Command
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance
V	volt
VFR	Visual Flight Rule
yd	yard
yd^2	cubic yard

1 INTRODUCTION

1.1 PURPOSE

The objective of this report is to describe and analyze the five alternatives for the Live-Fire Training Range Complex (LFTRC) that have been developed to meet service-identified training requirements for Marines relocating to Guam from Okinawa. These five LFTRC alternatives will be fully analyzed under the Guam Relocation Supplemental Environmental Impact Statement (SEIS). This technical report is intended to serve as a planning tool that supports the planning efforts for an LFTRC on Guam. Conclusions or recommendations are not provided in this report.

1.2 BACKGROUND

The development of an LFTRC would ensure the following: (1) live-fire training facilities are available for Marines based on Guam to meet their service-identified training requirements, as mandated by Section 5063 of Title 10 of the United States (U.S.) Code; (2) individual live-fire training requirements are satisfied as described in the Final Environmental Impact Statement (FEIS) (July 2010) and associated Record of Decision (ROD); and (3) an operational Marine Corps presence is established on Guam in accordance with April 2012 adjustments to the May 2006 United States-Japan Roadmap for Realignment Implementation (Roadmap). The LFTRC on Guam would allow simultaneous use of all firing ranges to support training and operations of the relocated Marines. The proposed action would also include a Main Cantonment area of sufficient size and layout to provide military support functions, including Family Housing, utilities, infrastructure, and bachelor housing. The Main Cantonment and associated infrastructure improvements are described in the *Guam and the Commonwealth of the Northern Mariana Islands (CNMI) 2012 Roadmap Adjustments Planning Report* – Pre-Final, June 2013 (NAVFACPAC 2013a).

The LFTRC would consist of a Known Distance (KD) Rifle Range, a KD Pistol Range, a Modified Record of Fire (MRF) Range, a Non-Standard Small Arms (NSSA) Range, a Multi-Purpose Machine Gun (MPMG) Range, and a Hand Grenade Range. The complex would also include the construction of utilities and infrastructure developments required to support each of the ranges.

The Marines identified five alternative locations for the LFTRC: one is located adjacent to Route 15 in northeastern Guam; three are located at or immediately adjacent to the Naval Munitions Site (NMS); and one is located at Andersen Air Force Base (AAFB) Northwest Field (NWF) in northern Guam. The alternatives may continue to evolve as the Marines consider public and regulatory agency input through the National Environmental Policy Act (NEPA) process. For example, the Marines are currently working with the Federal Aviation Administration (FAA) to determine whether airspace impacts would render a preliminary alternative untenable. If the FAA concludes that an alternative's impacts on existing airspace cannot be mitigated, that alternative would not be carried forward for evaluation in the SEIS.

1.2.1 2010 Final Environmental Impact Statement

The 2010 FEIS contained two LFTRC alternatives, Range Alternatives A and B (Figure 1.2-1). These two alternatives were both located in the Route 15 area in northeastern Guam. Range Alternative A required the realignment of Route 15 to the interior of the existing Andersen South Parcel and the acquisition of an estimated 1,090 acres (ac) (441 hectares [ha]). Range Alternative B did not require the realignment of Route 15 but required the acquisition of an estimated 1,800 ac (728 ha). Range Alternative A was identified as the Preferred Alternative because it involved the least amount of land acquisition and the least impact on the Pagat historical site.

The Navy and Army September 2010 FEIS ROD deferred the selection of a specific LFTRC location on Guam, pending completion of the Section 106 consultation process under the National Historic Preservation Act.

1.2.2 March 2012 Joint Guam Project Office Technical Report and Live-Fire Training Range Complex Supplemental Environmental Impact Statement Public Scoping

Following the September 2010 ROD, the Marine Corps investigated a methodology that offered the potential of reducing the overall size requirement for the LFTRC alternatives by reducing the dominant footprint of the MPMG Range's Surface Danger Zone (SDZ) that generally establishes the SDZ for the entire range complex. This methodology, the Probabilistic Surface Danger Zone (PSDZ), was first applied to Range Alternative A MPMG Range and resulted in a smaller overall LFTRC SDZ with fewer impacts on the Pagat Trail and Pagat Village historical sites. The PSDZ methodology is described in greater detail in Section 2.2.

Under the auspices of the Joint Guam Program Office (JGPO), the PSDZ methodology was then applied to previously considered and eliminated sites to determine if the application of a smaller SDZ changed previous conclusions as to the suitability and feasibility of those sites as reasonable alternatives. A total of 26 sites were reevaluated. As a result of this reevaluation, five alternatives were carried forward for analysis in the SEIS. The alternatives included Route 15 Adjusted Option A, Route 15 Adjusted Option B, and three sites within and adjacent to the NMS in southern Guam. These five alternatives were included in the LFTRC SEIS Public Scoping Meeting held on Guam in March 2012 (Figure 1.2-2).

1.2.3 Expanded Supplemental Environmental Impact Statement Scope

On April 27, 2012, shortly after the close of the LFTRC SEIS public scoping period, the U.S.-Japan Security Consultative Committee issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Realignment Roadmap. In accordance with the Security Consultative Committee's adjustments, the Department of Defense (DoD) adopted a new force posture in the Pacific that provided for a materially smaller force on Guam. Specifically, the adjustments included reducing the originally planned relocation of approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and 1,300 dependents on Guam. This decision prompted the Marines to review the major actions previously planned for Guam and approved in the September 2010 ROD. The Marines concluded that while some actions were unaffected by the reduced force size, other actions could significantly change as a result of the modified force, such as the Main Cantonment and Family Housing areas. The Navy opted to issue a new Notice of Intent and

expanded the scope of the LFTRC SEIS to include those actions that may materially change as a result of the new force posture.

The expanded SEIS would evaluate the potential environmental impacts from construction and operation of an LFTRC, a Main Cantonment area (including Family Housing), and associated infrastructure on Guam to support the relocation of a substantially reduced number of Marines than previously analyzed. The reduction in the number of Marines and dependents to be relocated to Guam led to a reduction in the required footprint for the Main Cantonment area, enabling the Navy to identify other preliminary alternatives in addition to Naval Computer and Telecommunications Station (NCTS) Finegayan for the Main Cantonment and Family Housing area. These additional alternatives include: AAFB; NCTS Finegayan (Main Cantonment)/South Finegayan Navy Housing (Family Housing); and Navy and Air Force Barrigada in central Guam. The possibility of not establishing the Main Cantonment area at NCTS Finegayan allowed that area to be considered as a new preliminary alternative for the LFTRC. Consideration of public input, refinement of range designs, and a reassessment of operational requirements, conflicts, and opportunities resulted in the addition of NWF at AAFB as a new preliminary range alternative. Therefore, the Marines identified a total of seven preliminary site alternatives for the LFTRC: two Route 15 preliminary alternatives in northeastern Guam; three preliminary alternatives located at or immediately adjacent to NMS; one preliminary alternative at NWF in northern Guam; and one preliminary alternative at NCTS Finegayan on the northwestern coast of Guam. These seven preliminary alternatives were included in the SEIS Public Scoping Meeting held on Guam in November 2012 (Figure 1.2-3).

1.2.4 Preliminary Airspace Feasibility Assessment

In the Notice of Intent (October 2012), the Navy informed the public that preliminary LFTRC alternatives could evolve as the Navy considered public and regulatory agency input through the NEPA process. Specifically, the Navy noted that coordination with the FAA was ongoing in an effort to determine whether airspace impacts would render a preliminary LFTRC alternative infeasible and, therefore, would not be carried forward for evaluation in the SEIS. As a result of interagency coordination, in January 2013, the FAA provided the Navy with a feasibility assessment of each preliminary LFTRC alternative, intended to assist the Navy in identifying which alternatives would be carried forward for further analysis in the SEIS. The FAA emphasized that its feasibility assessment neither represented an endorsement of a particular preliminary LFTRC alternative nor considered any required safety risk mitigation. Noting that the island of Guam is surrounded by highly convective airspace, the FAA's feasibility assessment concluded that each preliminary LFTRC alternative would result in some impact on aviation. The Naval Flight Information Group (NAVFIG), which manages Navy Terminal Instrument Procedures (i.e., the requirements and standards for instrumented approaches at an airport), reviewed and concurred with the FAA's feasibility assessment. In response to the FAA's assessment and NAVFIG's concurrence, the Navy's airspace/air traffic control (ATC) experts undertook a subsequent analysis that focused on both quantifiable airspace/ATC impacts (e.g., frequency and severity) associated with each preliminary LFTRC alternative and corresponding operational impacts on the proposed range operations and training.

The FAA's feasibility assessment determined that the preliminary LFTRC alternative at Route 15B would impact arrivals and departures at the Guam International Airport, regardless of runway use, due to the direct proximity

of the alternative to established instrumented approaches, missed approach procedures, and known daily flight paths of civilian aircraft. Further, the FAA emphasized that the Route 15B preliminary alternative was located within Class D airspace, which requires aircraft to adhere to certain Visual Flight Rules (VFR) for cloud clearance and visibility requirements, and maintain two-way ATC communications. Class D airspace is generally cylindrical in form and normally extends from the surface to 2,500 feet (760 m) above the ground. The outer radius of the airspace is variable, but is generally 4 nautical miles (7.4 kilometers [km]).

The Navy's subsequent airspace/ATC analysis concluded that airspace/ATC impacts associated with the Route 15B preliminary LFTRC alternative could not be mitigated and, therefore, would not satisfy the primary screening criteria associated with sufficient airspace. The Route 15B preliminary LFTRC alternative will not be carried forward for further evaluation in the SEIS.

The FAA's feasibility assessment also determined that the preliminary LFTRC alternative at Finegayan would impact arrivals and departures at Guam International Airport and AAFB and, therefore, would not be feasible. The Navy's subsequent airspace/ATC analysis concluded that airspace/ATC impacts associated with the Finegayan preliminary LFTRC alternative could not be mitigated. As a result, the Navy determined that the Finegayan preliminary LFTRC alternative would not satisfy the primary screening criteria associated with sufficient airspace. The Finegayan preliminary LFTRC alternative will not be carried forward for further evaluation in the SEIS.

This preliminary screening resulted in the remaining five LFTRC alternatives being carried forward for further development and SEIS analysis (Figure 1.2-4), which include the following:

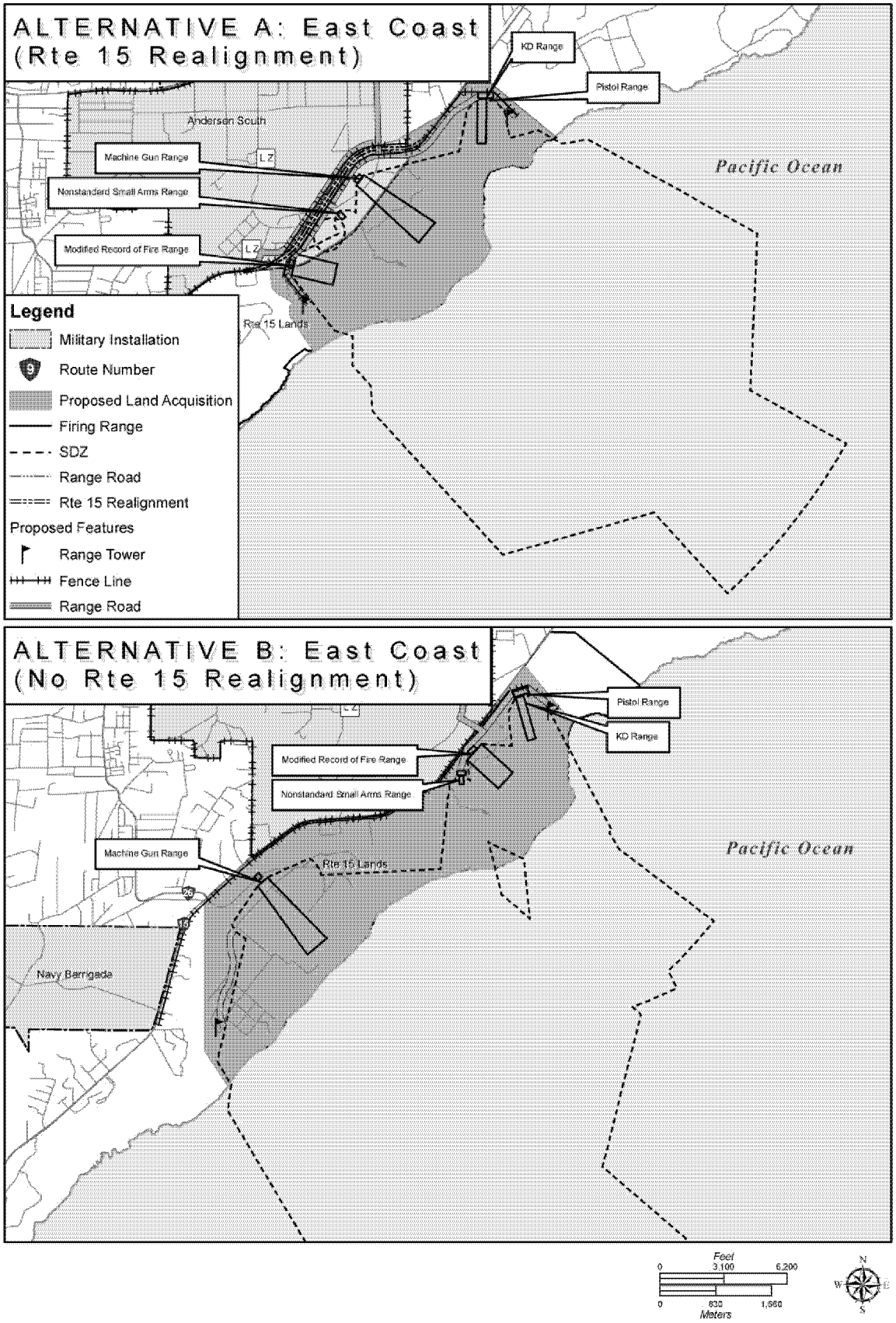
- NWF alternative;
- Route 15A (RT 15A) alternative;
- NMS North/South alternative;
- NMS L-Shaped alternative; and
- NMS East/West alternative.

1.2.5 Live-Fire Training Range Complex Alternatives Refinement

Detailed analysis and planning has occurred on the five LFTRC alternatives. Refinements made to the alternatives included:

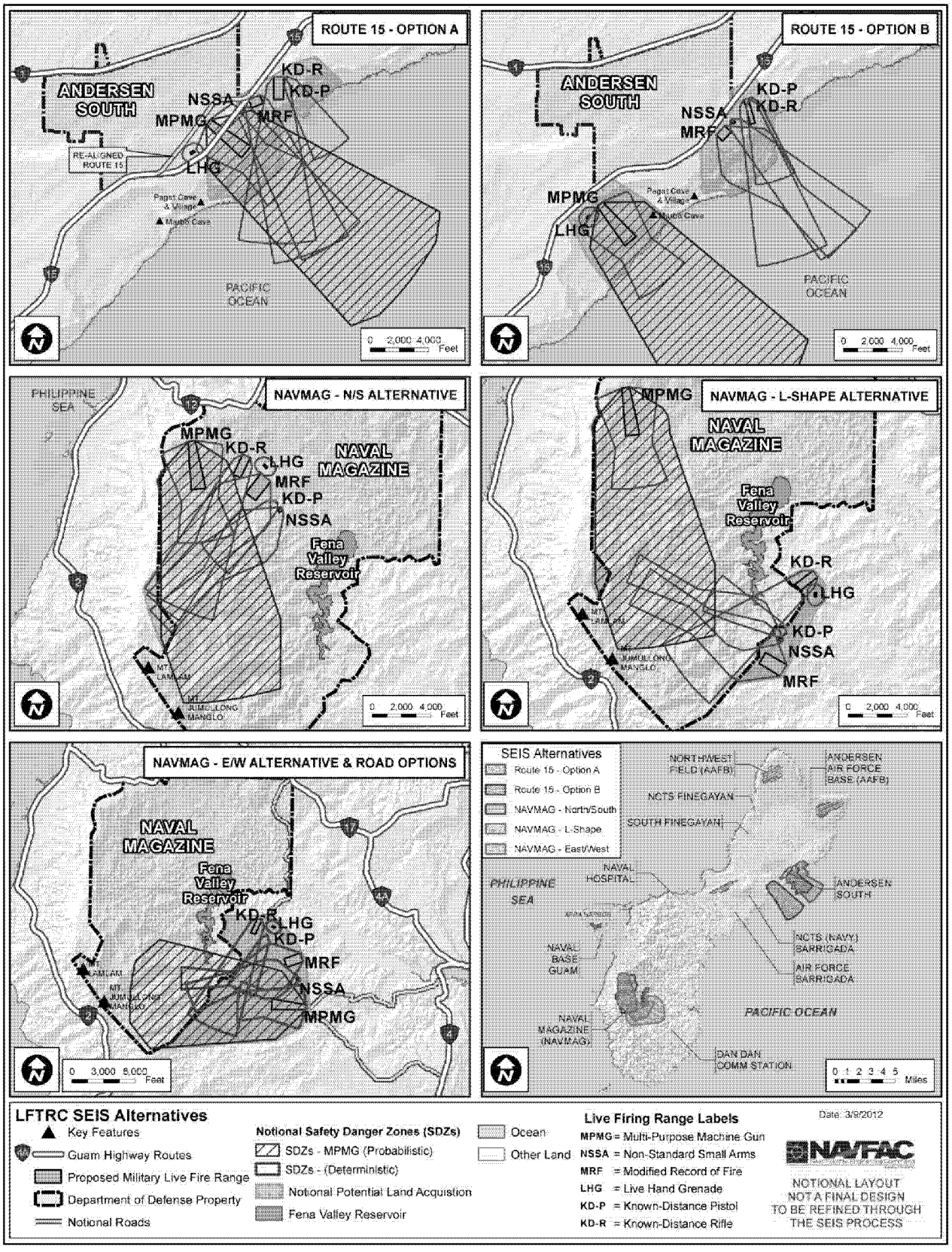
- Development of MPMG grading plans to facilitate MPMG PSDZ development by Marine Corps Training and Education Command (TECOM).
- Development of MPMG PSDZs by TECOM.
- Application of TECOM developed PSDZs and adjustment of range laydowns, as necessary.
- Drafting of Conceptual Development Plans (CDPs) for each alternative to situate supporting facilities and infrastructure improvements.
- Development of grading plans to support all ranges and associated facilities and infrastructure.

The refined LFTRC alternatives are shown in Chapter 3.



Source: Provided by AECOM.

Figure 1.2-1: Range Alternatives from the 2010 Guam and CNMI Military Relocation FEIS



Source: Provided by AECOM.

Figure 1.2-2: LFTRC SEIS Public Scoping Alternatives, March 2012

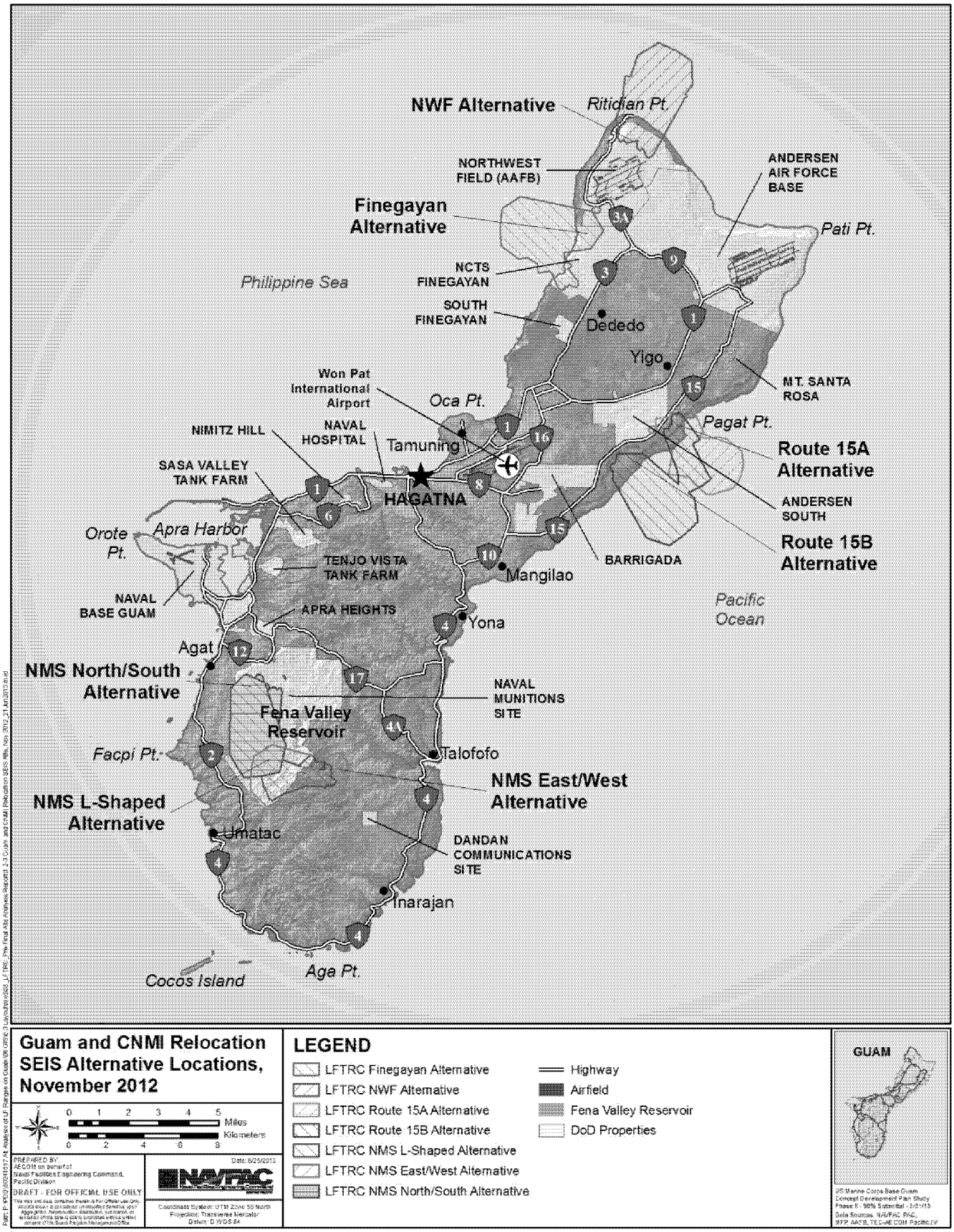


Figure 1.2-3: Guam and CNMI Relocation SEIS Alternative Locations, November 2012

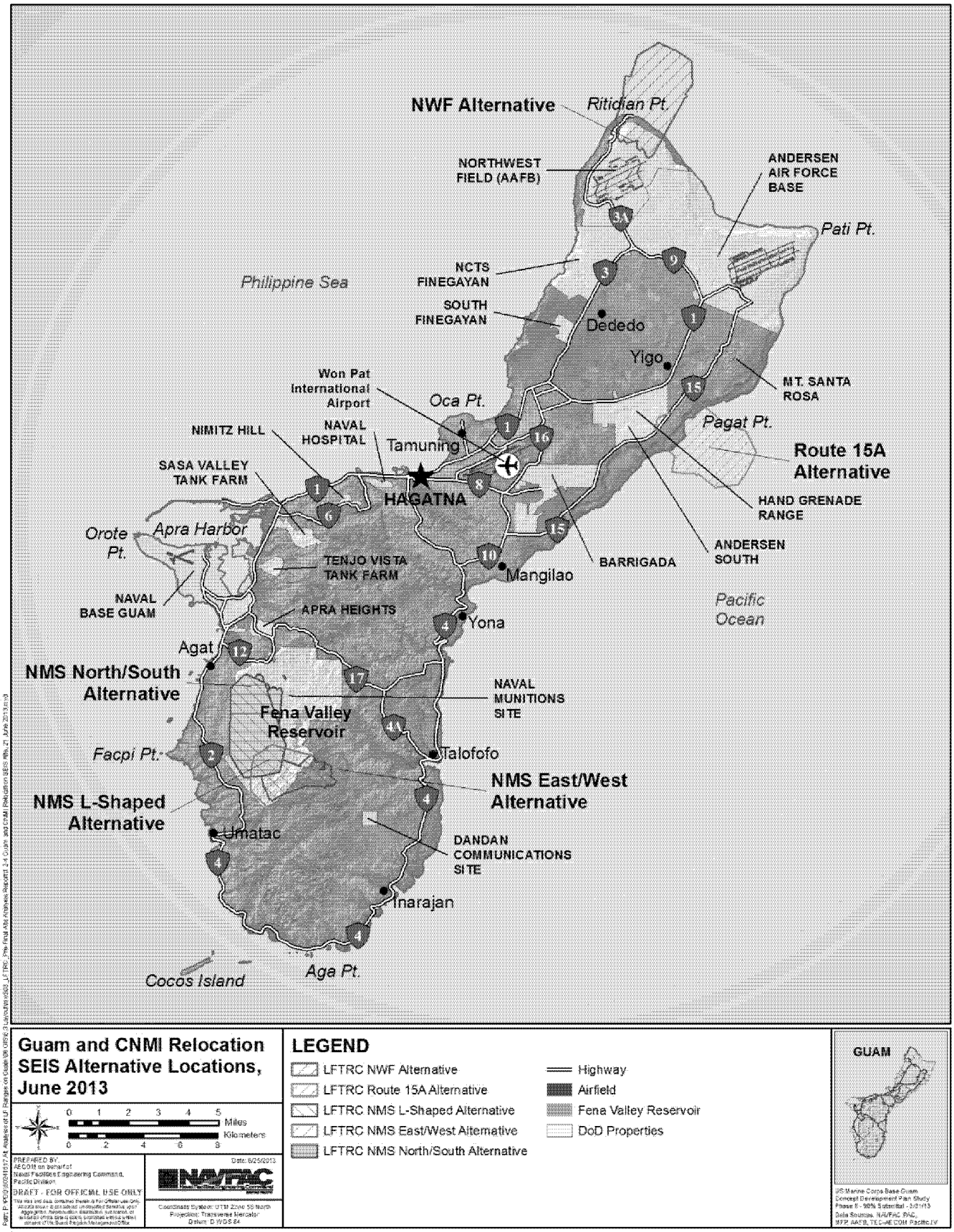


Figure 1.2-4: Guam and CNMI Relocation SEIS Alternative Locations, June 2013

2 PLANNING CONSIDERATIONS

2.1 SURFACE DANGER ZONE

An SDZ is the ground and airspace designated within the training complex for the vertical and lateral containment of projectiles, fragments, debris, and components from the firing, launching, or detonation of weapons systems, including explosions and demolitions. SDZs serve as three-dimensional areas that delineate that portion of the earth and the air above in which personnel and/or equipment may be endangered by ground weapons firing or detonation activities because of ricochet or fragmentation hazard. For safety purposes, outdoor ranges have SDZs.

The size and configuration of SDZs are determined through testing and computer simulation and are dependent on the performance characteristics of a given weapons system, training requirements, range configuration, geographical location, and environmental conditions. Criteria from Marine Corps Order (MCO) 3570.1C, *Range Safety* (Marine Corps 2012), define the SDZs for individual weapons systems based on weapon and ammunition characteristics. In addition, computer simulation models, based on and validated by actual weapons system firing, generate ballistic "footprints" that form the basis of SDZs.

The SDZs defined in MCO 3570.1C were developed using a deterministic approach that takes into account "worst-case" parameters for maximum distance, ricochet, impact medium, vertical hazard, and meteorological data effects as part of establishing the geographic limits of the SDZ. Deterministic SDZs represent containment of hazardous activity at a 1:1 million probability, and can be located to meet any given situation irrespective of terrain.

Firing ranges typically have fan-shaped SDZs that contain the following:

- **Firing positions:** the location from where weapons are fired.
- **Target areas:** the area that contains the targets/backstops and is demarked by limits of fire delineators.
- **Dispersion areas:** the area that includes the ground and associated airspace within the training complex used to contain projectiles between points of fire and the farthest target, with allowance for overshot and horizontal aiming variation.
- **Buffer zones:** (also known as secondary danger areas): the area that contains the ricochets and fragments that may extend beyond the dispersion area.

SDZs must be devoid of unrelated facilities. Access to the SDZ is restricted to those involved in the conducted training. SDZs located over water and affecting navigable airspace are published on charts with access restrictions, as appropriate. Depending on the type of restriction, these spaces are monitored by range control during firing for safety.

For planning purposes, notional SDZs have been developed to guide the placement of ranges (Figure 2.1-1 through Figure 2.1-4). These notional SDZs were reviewed and approved by TECOM. As the planning process progresses and range designs mature, the SDZs would be certified by TECOM in accordance with MCO 3550.9, Marine Corps Ground Range Certification and Recertification Program (Marine Corps 2004). Use limitations of water and airspace affected by SDZs are subject to regulation by the U.S. Coast Guard, U.S. Army Corps of Engineers, and the FAA, as appropriate.

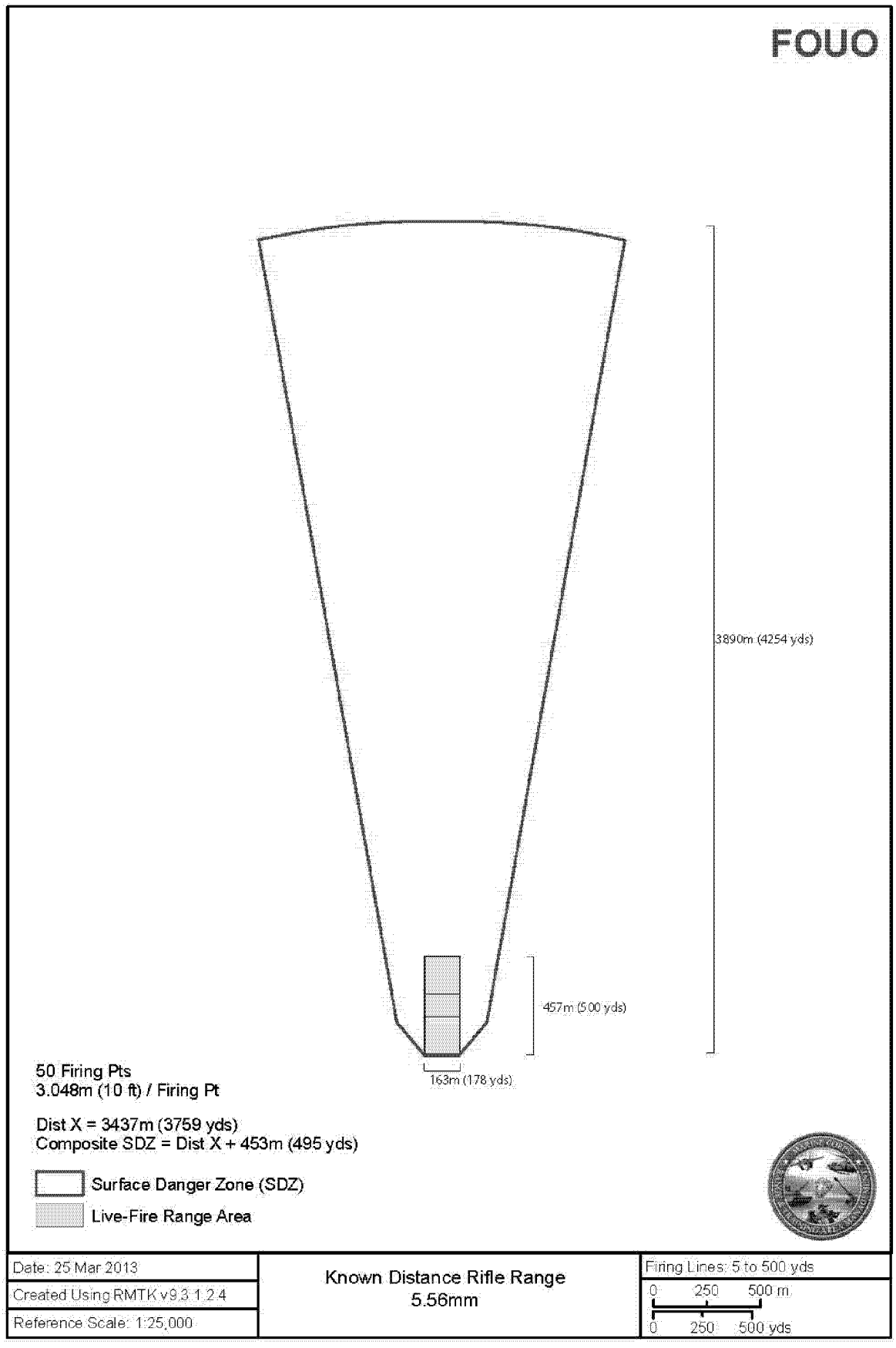
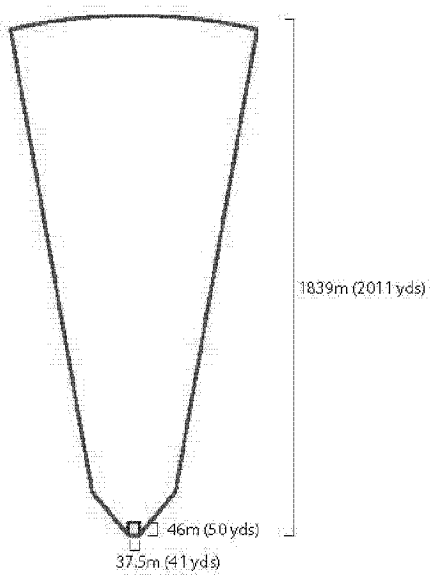


Figure 2.1-1: Known Distance Rifle Range, 5.56mm

FOUO



25 Firing Pts
1.5m / Firing Pt

Dist X = 1800m (1969 yds)
Composite SDZ = Dist X + 39m (43 yds)

Surface Danger Zone (SDZ)

Live-Fire Range Area

Date: 25 Mar 2013	Known Distance Pistol Range 9mm / .45 Cal	Firing Lines: 7/15/25/50 yds
Created Using RMTK v9.3.1.2.4		0 250 500 m
Reference Scale: 1:25,000		0 250 500 yds

Figure 2.1-2: Known Distance Pistol Range, 9mm/.45 Cal

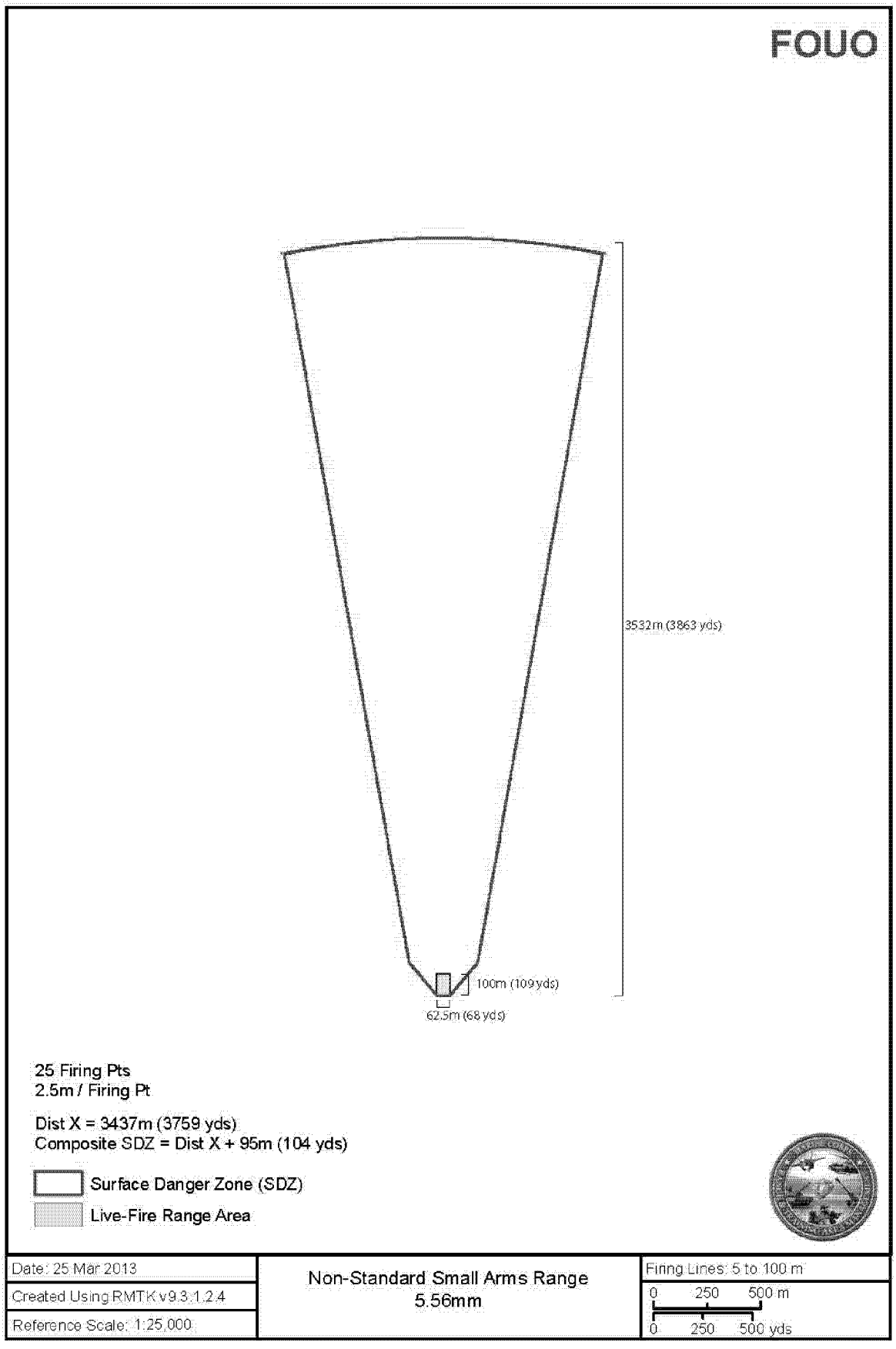


Figure 2.1-3: Non-Standard Small Arms Range, 5.56mm

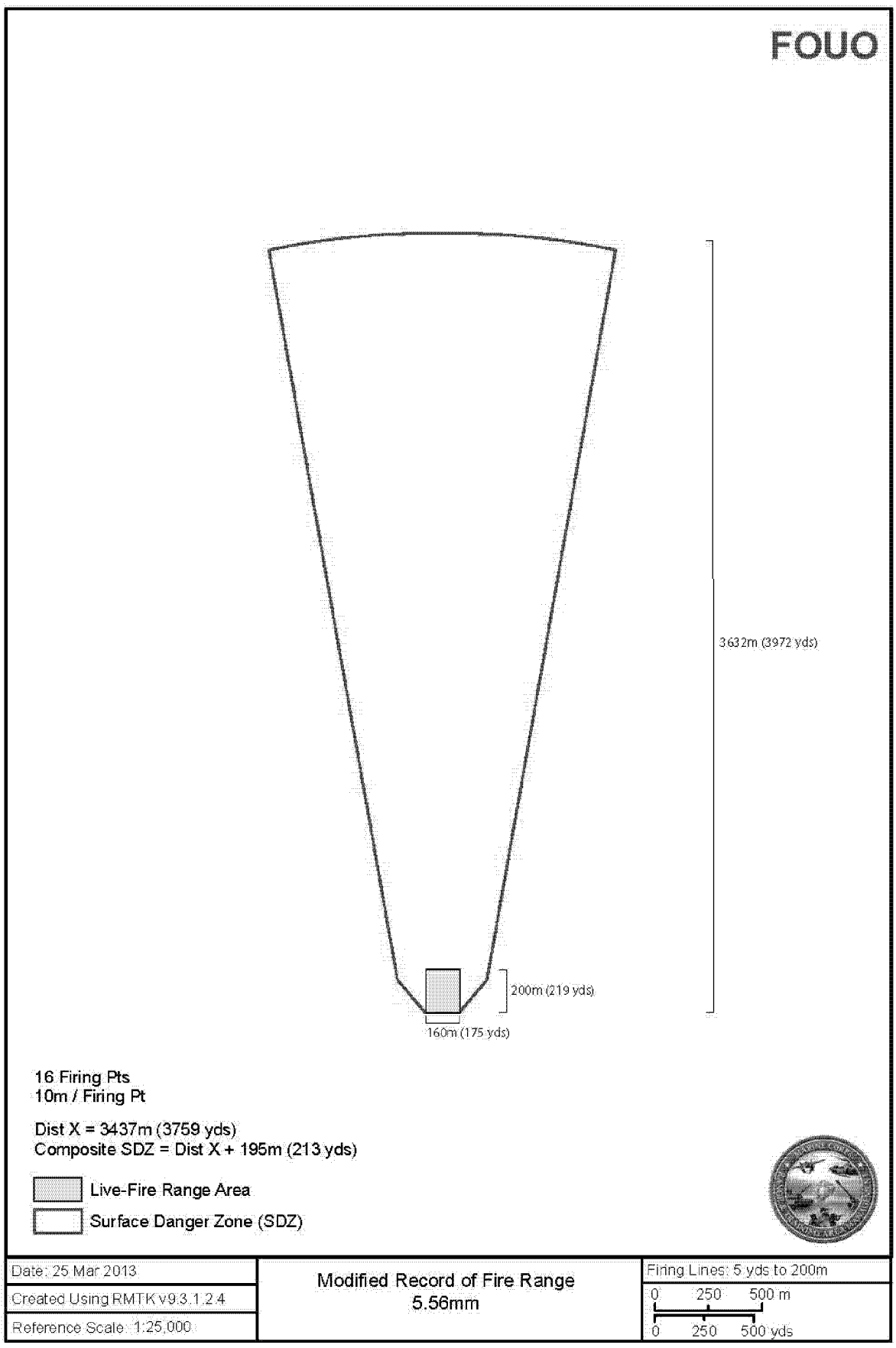


Figure 2.1-4: Modified Record of Fire Range, 5.56mm

2.2 PROBABILISTIC SURFACE DANGER ZONE

The PSDZ methodology was first approved for use in 2009 as directed in TECOM Safety of Use Memorandum 8-09. The PSDZ methodology represents an alternate means of defining an SDZ resulting in the same 1:1 million likelihood of escapement and containment of hazardous activity. Rather than "worst case," this methodology is site-specific and applied uniquely to each individual range situation. The PSDZ methodology uses very specific parameters, such as a given weapons and training event, specific terrain, weather conditions, elevation, firing positions, firing posture, and target location. The significant difference between the PSDZ methodology and the deterministic approach is that the PSDZ methodology relies on the precise conditions of the specified range, activity, and weapons system to establish the SDZ, while the deterministic approach relies on more generic parameters.

PSDZs have been used to recalculate the SDZs for two existing KD ranges at Cherry Point, North Carolina, and Marine Corps Base Hawaii. PSDZs have not been used for fire and movement/maneuver ranges or ranges that have the potential for increased ricochet potential (e.g., field firing ranges).

Because the ranges on Guam are currently in their planning stages, digital models of the proposed MPMG sites were developed to emulate the constructed ranges, and the PSDZ modeling was run on the digitally constructed range and altered terrain by TECOM. The resulting PSDZs are shown in Figure 2.2-1. Any changes or modification to this digital modeling or firing parameters and assumptions used for the analysis would invalidate the PSDZ and require additional analysis.

2.3 LIVE-FIRE TRAINING RANGE COMPLEX PLANNING CONSIDERATIONS

The following considerations were addressed in determining the feasibility, suitability, and acceptability of each LFTRC alternative.

2.3.1 Land/Sea/Air Space Availability

Sufficient land space should be available to support the target area of each proposed range and all range support facilities. All range areas and SDZs must be located on DoD-owned land, leased land, or controlled land/sea space. In instances where SDZs extend over off-shore waters, the affected waters must be charted and marked to prevent accidental entry during training. Sufficient air space over each range and SDZ must be available to contain the vertical hazards associated with live-fire training. Appropriate Special Use Airspace must be established with the FAA to allow for uninterrupted training and to safeguard aircraft operations in the vicinity of the LFTRC (MCO 3570.1C; Marine Corps 2012).

2.3.2 Supporting Infrastructure

Adequate roads, power, water, and wastewater should be available to support range operations. Local extensions and/or tie-ins to existing infrastructure are preferred. In cases where existing supporting infrastructure is not available, infrastructure should be upgraded or extended to the LFTRC.

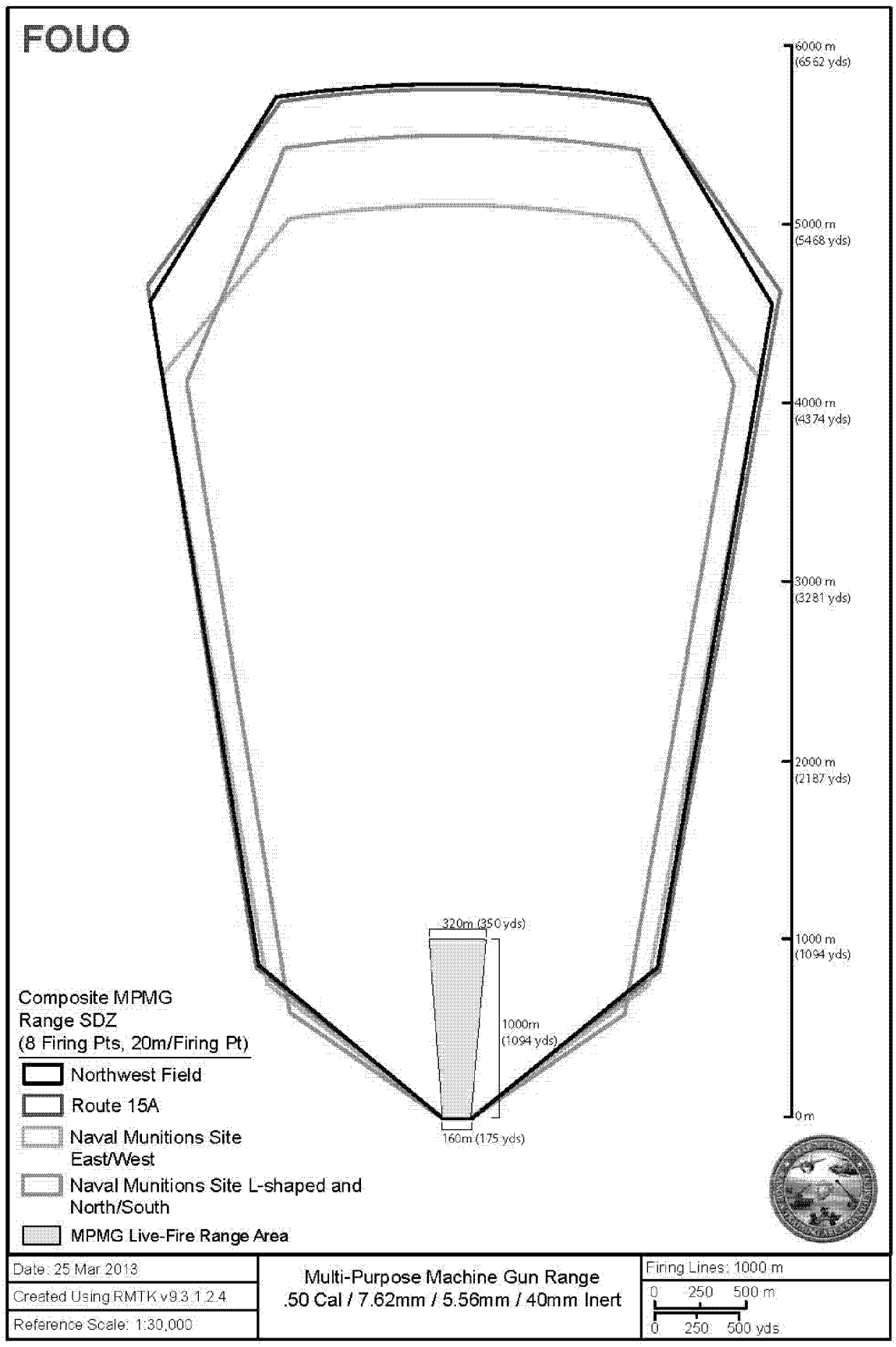


Figure 2.2-1: Multi-Purpose Machine Gun Range, .50 Cal/7.62mm/5.56mm/40mm Inert Training Rounds

2.3.3 Land Use Compatibility

The LFTRC site should be compatible with existing and surrounding land uses. Noise from live-fire training can create conditions that make certain land uses incompatible with range operations. Suggested land use compatibility in military training noise zones is outlined in Appendix B of Marine Corps Order 3550.11, *Range Air Installations Compatible Use Zones (RAICUZ) Program* (Marine Corps 2008). Planned growth in the vicinity of an LFTRC should not encroach upon range activities. Any incompatible facilities or infrastructure should be relocated.

2.3.4 Environmental Considerations

Environmental considerations have been taken into account in the planning and siting of each of the LFTRC alternatives, including avoidance and minimization of impacts on natural and cultural resources. Known wetlands, species of concern, and historic and archaeological resources were mapped and compared against the LFTRC laydowns and, where possible, the laydowns were shifted to minimize negative effects. Any remaining potential impacts associated with the various LFTRC alternatives will be assessed as part of the SEIS and through consultations with resource agencies as part of the Endangered Species Act (ESA).

2.3.5 Public Access

To access public areas such as cultural, historic, or recreational sites, entry may be allowed during non-firing periods into land/sea space covered by SDZs.

2.3.6 Range Transients

Unauthorized persons are prohibited from entering training complexes (MCO 3570.1C, 2012). The unannounced or unauthorized presence of individuals, livestock, aircraft, or watercraft traversing ranges or their associated SDZs can constrain training activities. The target area, airspace, and SDZ must be sufficiently monitored and controlled to prevent range transients.

Warning signs must be posted around the installation training complex to warn and prohibit entry by unauthorized persons, and to alert authorized personnel of hazard areas. Warning signs would be placed at 656-feet (200-meter) intervals or less, or in a way that ensures that persons entering the range would see at least one sign within a legible distance.

SDZs located over water must be published in Part 334, Title 33, Code of Federal Regulations (33 CFR 334, 1985). Firing cannot commence until the Coast Guard has marked the restricted danger area with buoys.

2.3.7 Operational Efficiency

Operational efficiency is achieved through effective siting and proximity to cantonment/billeting areas. Locating all firing ranges in a single complex allows for training efficiency, reduces overall space requirements, and lessens the potential for contamination by allowing SDZs to overlap. Proximity to cantonment areas produces training efficiencies by reducing the time spent transporting personnel and equipment to range areas.

2.3.8 Orientation

The geographical orientation of a firing range affects range operations and available hours of use. North/south facing ranges have the highest amount of available daytime use because personnel do not have to fire into the rising or setting sun.

2.4 LFTRC FACILITIES DESCRIPTIONS

2.4.1 Rifle Known Distance Range (Category Code Number [CCN] 17550)

The Rifle KD Range is designed for training rifle marksmanship and target engagement techniques (Figure 2.4-1). This range is used to train personnel on the skills necessary to identify, engage, and hit stationary targets in a static array from a known distance. The Rifle KD Range supports the Marine Corps' annual qualification and requalification required by the Marine Corps Combat Marksmanship Programs (MCO 3574.2K; Marine Corps 2007).

The proposed Rifle KD Range would provide 50 firing points to support training with 5.56 millimeter (mm) weapons. The range would be 178 yards (yd) (163 meters [m]) wide and 500 yd (457 m) from the farthest firing line to the target line. Other features would include:

- Target line flush with ground.
- Level ground from 200 yd (183 m) firing line to target line.
- 25-foot (ft) (8- m) tall impact berm behind the target line.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 250-person covered bleachers.
- Parking for range support personnel, Officers and Staff Non-Commissioned Officers (SNCOs), and range support vehicles.

The 18.5 ac (7.5 ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint in keeping with Best Management Practices.

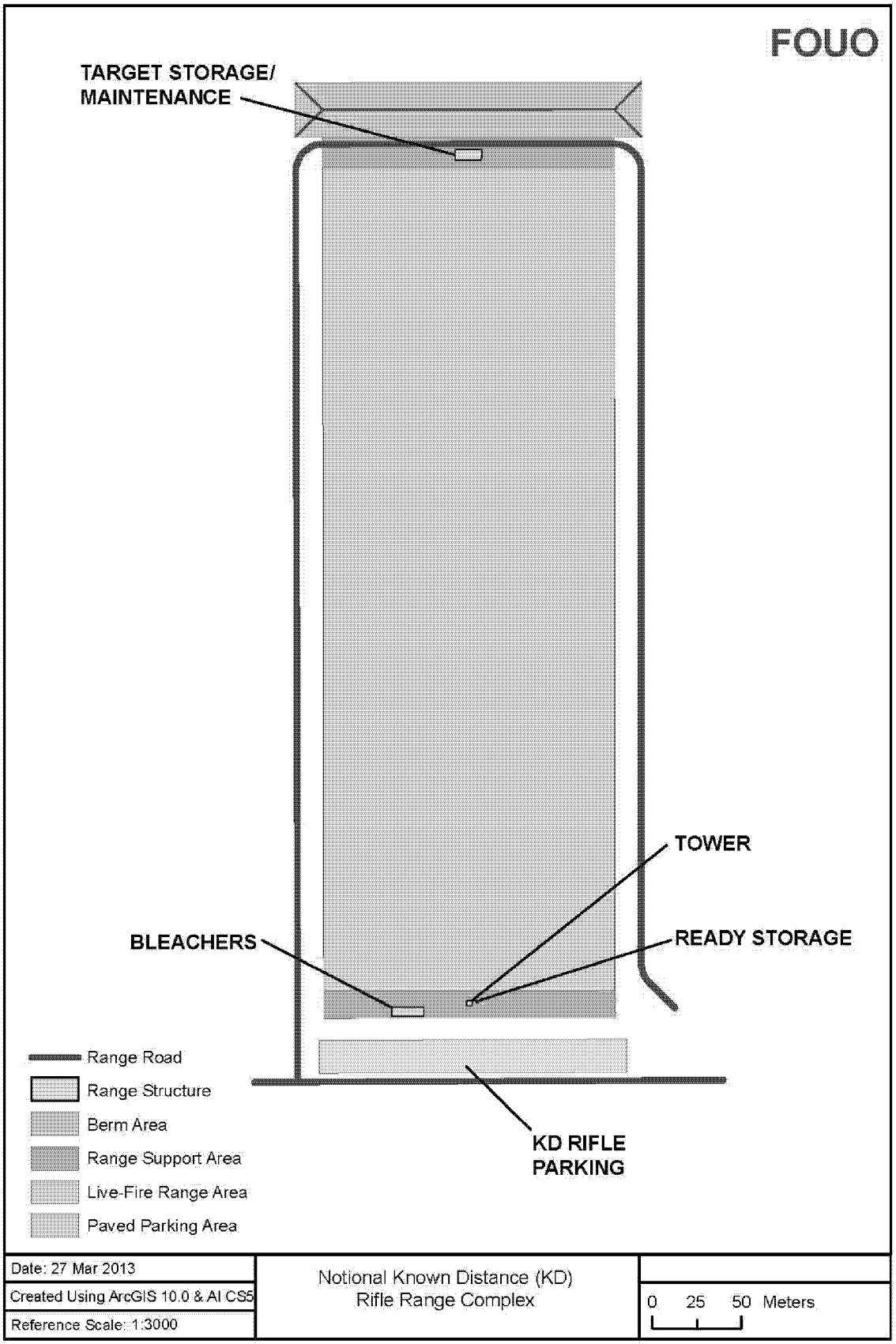


Figure 2.4-1: Notional Known Distance (KD) Rifle Range Complex

2.4.2 Pistol Known Distance Range (CCN 17570)

The Pistol KD Range is designed for training pistol and revolver marksmanship and target engagement techniques (Figure 2.4-2). This type of range is used to train personnel on the skills necessary to identify, engage, and hit stationary targets in a static array from a KD.

The proposed Pistol KD Range would provide 25 firing points to support training with 9mm and .45 caliber weapons. The range would be 41 yd (37.5 m) in width and 50 yd (46 m) from the farthest firing line to the target line. Other features would include:

- Level ground from 50 yd (46 m) firing line to target line.
- 12 ft (4m) tall impact berm behind the target line and 12 ft (4m) lateral berms.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 100-person covered bleachers.
- Parking for range support personnel, Officers and SNCOs, and range support vehicles.

The 0.4 ac (0.2 ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

2.4.3 Non-Standard Small Arms Range (CCN 17502)

The Non-Standard Small Arms (NSSA) Range is designed for training requirements that are not associated with current published doctrine, but fall within a commander's training requirements (Figure 2.4-3).

The proposed NSSA Range would provide 25 firing points to support training with 5.56mm weapons. The range would be 68 yd (62.5 m) in width and 109.4 yd (100 m) from the farthest firing line to the target line. Other features would include:

- Level ground from 100 yd (91 m) firing line to target line.
- 16 ft (5 m) tall impact berm behind the target line and 16 ft (5 m) lateral berms.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 100-person covered bleachers.
- Parking for range support personnel, Officers and SNCOs, and range support vehicles.

The 1.5-ac (0.6 ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

2.4.4 Modified Record of Fire Range (CCN 17532)

The Modified Record of Fire (MRF) Range is designed for training and day/night qualification with rifles (Figure 2.4-4).

The proposed MRF Range would provide 16 firing points to support training with 5.56mm weapons. The range would be 175 yd (160 m) in width and 219 yd (200 m) from the farthest firing line to the target line. All targets are fully automated and the event-specific target scenario is computer driven and scored from the range operations center. Other features would include:

- 25 ft (8 m) tall impact berm at the far end of the range.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 100-person covered bleachers.
- Parking for range support personnel, Officers and SNCOs, and range support vehicles.

The 7.9 ac (3.2 ha) range footprint would be entirely cleared of vegetation and the range designed so that expended rounds would be contained within the range footprint. Following construction, some grassy vegetation may be introduced for erosion and stormwater control in some areas of the range footprint.

2.4.5 Multi-Purpose Machine Gun Range (Automated) (CCN 17582)

The automated MPMG Range is designed for zeroing, training, and qualification requirements with Squad Automatic Weapons, sniper weapons, and machine guns (Figure 2.4-5). The range is used to train personnel on the skills necessary to identify, engage, and hit stationary and moving targets in tactical arrays. All targets on this range are fully automated, and the event-specific target scenario is computer driven and scored from the range operations center.

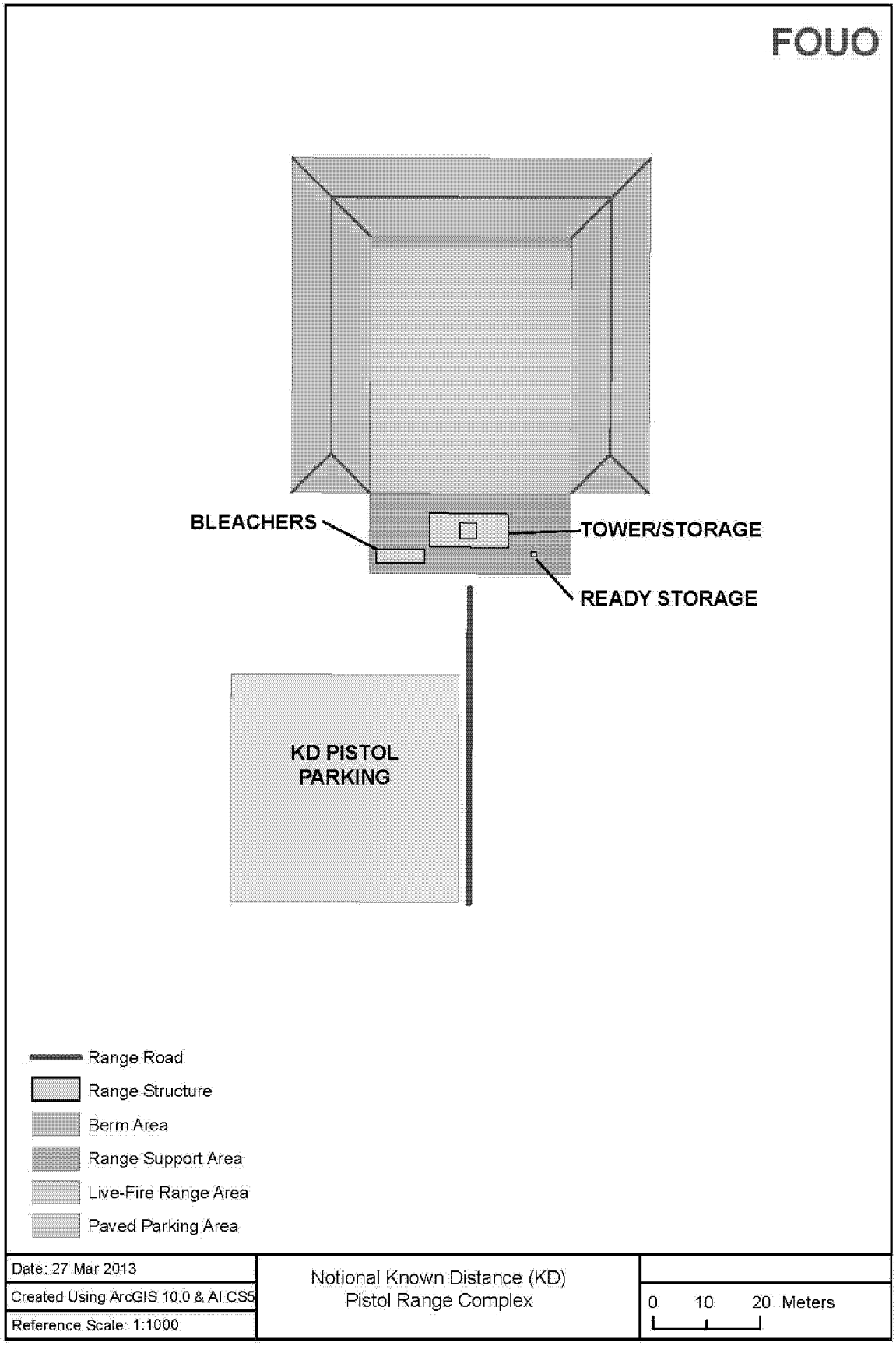


Figure 2.4-2: Notional Known Distance (KD) Pistol Range Complex

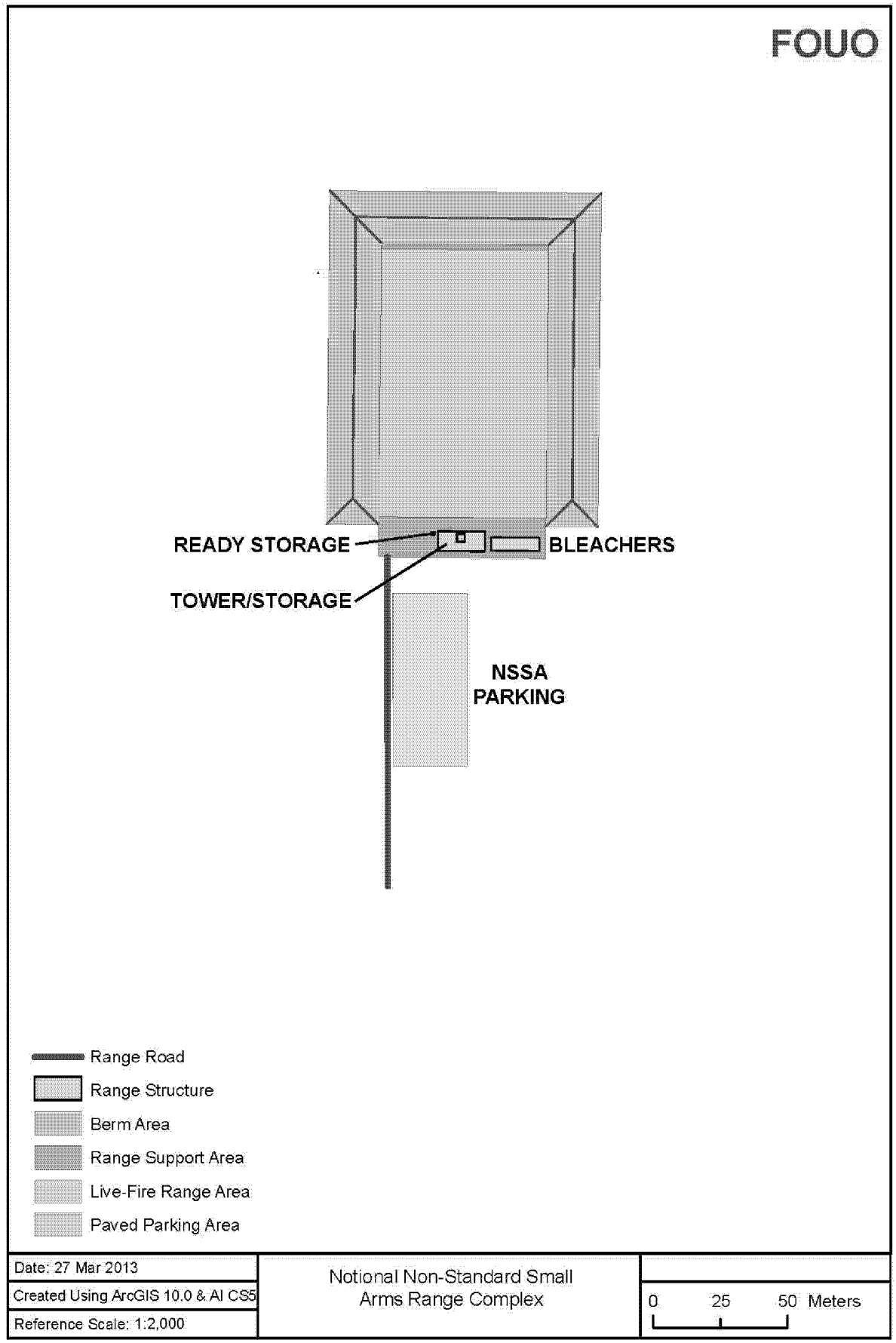


Figure 2.4-3: Notional Non-Standard Small Arms Range Complex

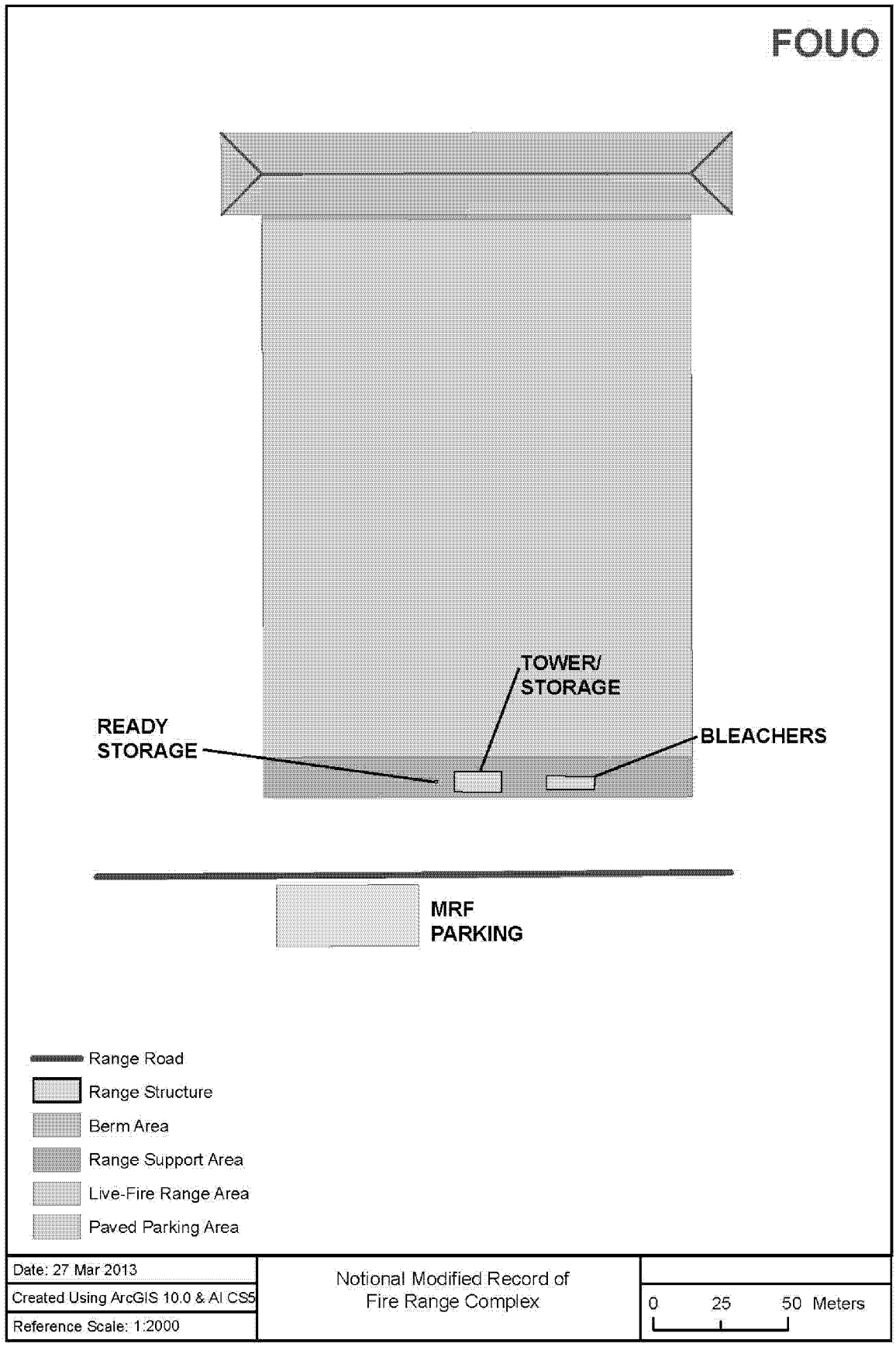


Figure 2.4-4: Notional Modified Record of Fire Range Complex

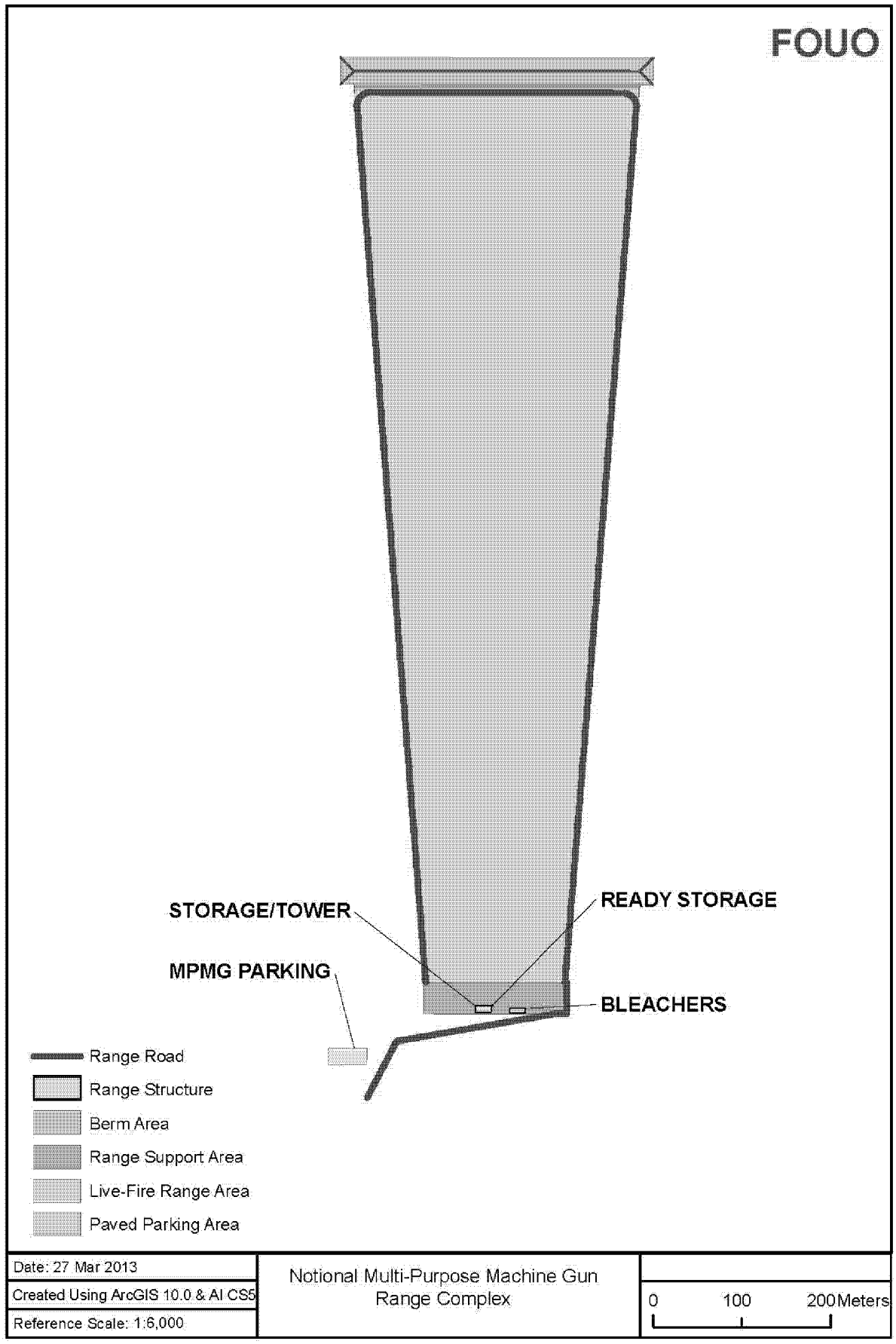


Figure 2.4-5: Notional Multi-Purpose Machine Gun Range Complex

The proposed MPMG Range would provide eight firing points to support training with 5.56mm, 7.62mm, .50 caliber, and 40mm weapons. The 40mm training would be restricted to Inert Training munitions. The range would be 175 yds (160 m) wide at the firing line, expanding to 350 yds (320 m) wide at the far end of the range, and 1,093.6 yds (1,000 m) long from the firing line to the farthest target line. Other features would include:

- 25 ft (8 m) tall impact berm at the far end of the range.
- Trench for future automated target scoring system.
- Range Operations Tower.
- Target storage and maintenance shed.
- Portable toilets.
- Ready issue magazine.
- 150-person covered bleachers.
- Parking for range support personnel, Officers and SNCOs, and range support vehicles.

The range footprint would encompass an estimated 59 ac (24 ha). Natural terrain and vegetation may be incorporated into the range as long as line-of-sight is maintained between the firing line and targets/target arrays. The overall acceptable slope for the range is of +/- 2 %.

2.4.6 Hand Grenade Range (CCN 17810) and Hand Grenade House

An approximately 0.9 ac (0.4 ha) area would be cleared and developed as a hand grenade training range complex for the M67 fragmentation hand grenade (Figure 2.4-6). It would consist of a demonstration area with bleachers, an open practice throwing field with various targets and throwing positions located outside of the hazard zone, and a parking area. A 1.0 ac (0.4 ha) training and demonstration field would also be developed adjacent to the range. The following would be located within the hazard zone: a holding shelter for the subsequent throwing relay of four persons; four throwing positions with grenade sumps, located approximately 17 ft (5 m) apart; a Range Control Tower with ballistic glass; and a grenade dudded impact area (explosive impact area with the potential to contain unexploded charges) approximately 66 ft (20 m) from the throwing positions.

The proposed Grenade House would be co-located with the grenade throwing pits utilizing the same associated features and Range Control Tower. The Grenade House, a structure made of Shock Absorbing Concrete (SACON) or other bullet absorbing material, would be approximately 33 ft (10 m) by 33 ft (10 m) in size.

Training for this individual combat skill is conducted at individual stations and is enhanced when co-located with Military Operations in Urban Terrain (MOUT) and maneuver training areas. The Grenade House would provide four stations to accommodate training for up to four personnel at any given time. Fragmentation grenades would be authorized for use at the Grenade House. Munitions would be temporarily stored in a permanent concrete structure (magazine) with dimensions of approximately 10 ft (0.3 m) by 10 ft (0.3 m). An earthen berm would border three sides of the magazine, which would be located nearby for convenient access during the

training exercise. Operations at the proposed Grenade House would be suitable for fire team and squad training.

2.4.7 Range Maintenance and Storage Building (CCN 17310)

The 27,500 square foot (ft^2) (2,555 square meter [m^2]) Range Maintenance and Storage Building would include offices for maintenance, supply, and environmental personnel; a maintenance bay for range vehicles; delivery point and storage for materials; carpenter shop for target construction/repair; storage for targets; and storage and repair for range maintenance equipment such as tractors and mowers. In addition, separate flammable storage is required for gasoline and other volatile consumables used in target repair.

2.4.8 Range Observation Towers (CCN 17935-1.2)

Range Observation Towers are proposed to support the observation of SDZs that extend over nearshore waters. These towers would have a 97 ft^2 (9 m^2) footprint and would be 33 ft (10 m) high. They are designed for manned and unmanned operation. Each tower would be equipped with day/night thermal cameras to provide enhanced observation of the over-water SDZs during periods of darkness or inclement weather. All cameras would be centrally monitored and remotely controlled by the Range Control Facility at the Main Cantonment area.

2.4.9 Entry Control Point

The Entry Control Point (ECP) would control vehicular access to the LFTRC and serve as the primary means of entry. A 540 ft^2 (50.2 m^2) Sentry House (CCN 73025) provides all-weather protection to ECP security personnel and visitors' credential screening. An adjacent parking lot would provide parking for security vehicles and visitors during any required processing.

2.4.10 Range Control Facility

The Range Control Facility (RCF) would be located on the Main Cantonment to facilitate coordination with operational units and headquarters and is included as part of each Main Cantonment alternative. The RCF has three functional areas:

- The Range Support Section is responsible for the day-to-day operations of the RCF, including budget development/execution, personnel administration, range sustainment and upgrades, range automation, training support, and geographic information system (GIS) support.
- The Range Maintenance Section is responsible for the upkeep of the ranges and training areas, including the submission of work requests, vegetation control, and target repair.

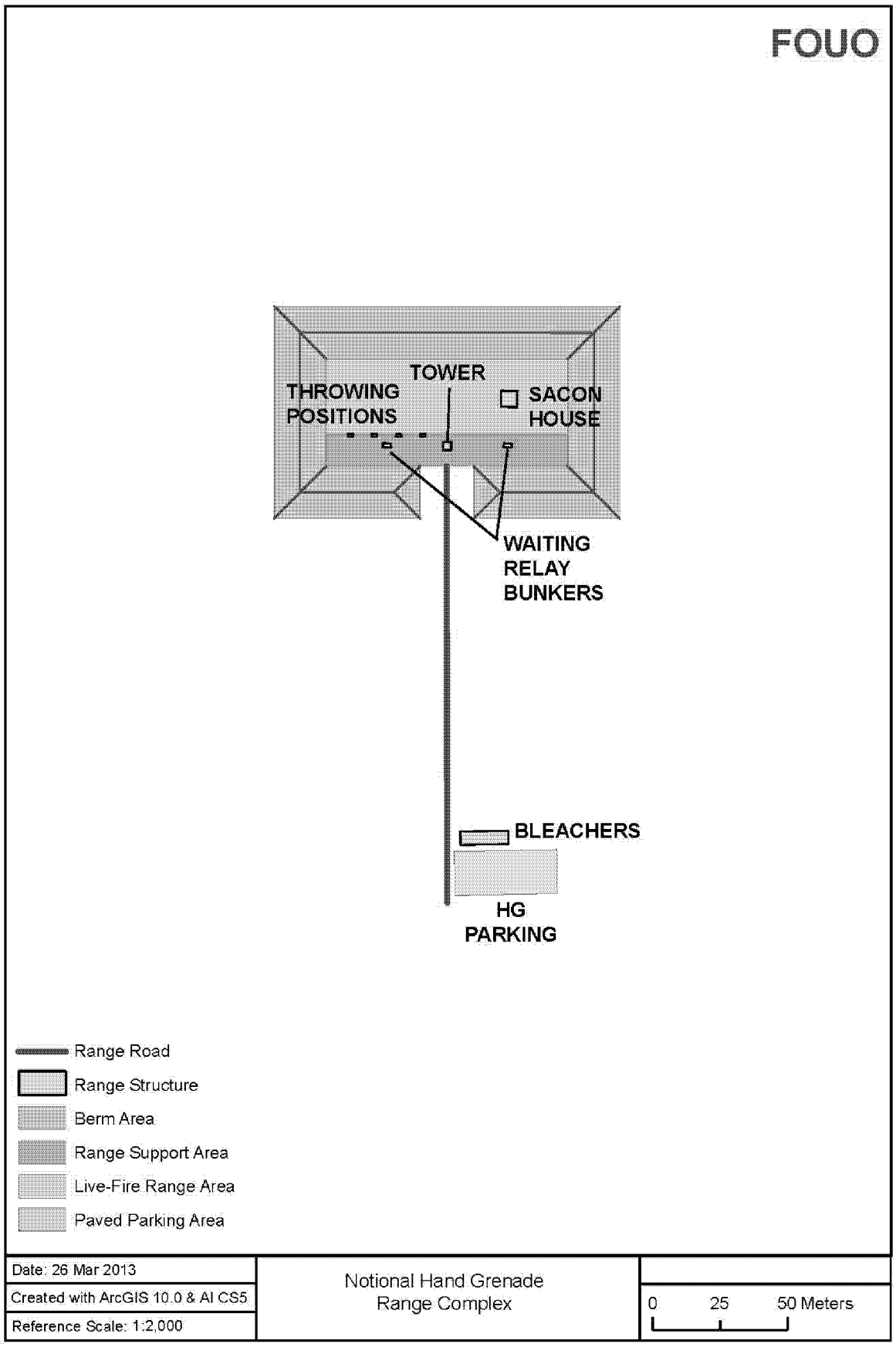


Figure 2.4-6: Notional Hand Grenade Range Complex

- The Operations Section consists of three distinct but integrated areas: Scheduling, Fire Desk Operations, and Range Safety, as described below.
    - Scheduling of the LFTRC would be accomplished by using the Range Facility Management Support System, which is a web-based, automated scheduling system that allows remote users to verify the availability of LFTRC facilities and associated airspace; submit requests for scheduling the LFTRC and associated airspace; and determine the status of previously submitted LFTRC requests. The scheduling function also provides the ability for range control personnel to approve, process, and track LFTRC requests; schedule training area maintenance; resolve scheduling, safety, airspace, or environmental conflicts (deconfliction); and publish a range bulletin that reflects LFTRC assignments for a specific period.
    - Fire Desk Operations would authorize scheduled units for access onto the appropriate range; provide real-time monitoring of the LFTRC and associated airspace's training status, which is accomplished by both ground and air Position Location Identification systems; and collect range utilization data. If there is a real or perceived safety violation/concern (e.g., aircraft entering the SDZ of a "hot" range, units not maintaining radio communications, severe weather approaching, etc.), the Fire Desk Operator would immediately take the necessary actions to correct the situation.
    - Range Safety personnel would ensure that training units are equipped with the authorized weapons and ammunition for that specific range; have established radio contact with the RCF prior to live fire; understand the range limitations; serve as the first responders to any Range Training Area accident; and would conduct pre- and post-inspections of the range.

The Marines would be responsible for the organizing, training, and equipping of the RCF. The Marines would also coordinate with other services and Range Training Area users on Guam to integrate their respective RCFs into a larger, joint range management and control capability as additional Range Training Areas come online within the Mariana Islands Range Complex.

2.5 UTILITIES

2.5.1 Electrical Power

The electrical power demand for the LFTRC is based on the required power to support the various towers, ECPs, Range Maintenance Buildings, and outdoor lighting (to support limited night time use). Using a diversity factor of 27% since not all connected loads are active at the same time, the estimated maximum total demand from the LFTRC facilities would be less than 100 kilowatts (kW).

In general, service to the site would be via single-phase, underground power lines, using either 13.8 kilovolts (kV) or 4,160 volts (V), depending on the existing available primary power source at each site. Where the electrical routing is in parallel with the Information Technology (IT)/Communication (Comm) lines, the primary power lines would be installed underground, in the same trench as the IT/Comm lines. Low voltage power to the buildings would be 120/240 V, single phase to be fed from a pad-mounted distribution transformer.

Because of the distance between buildings, each building would be served with a separate transformer rather than using a common transformer to serve multiple buildings.

The power demand from the LFTRC would be insignificant and would not impact Guam Power Authority (GPA) transmission or local distribution systems. The power to the LFTRC would be supplied by connecting to the closest available distribution system lines, whether owned by DoD or GPA. The LFTRC power distribution lines are shown in the electrical distribution figures provided in Chapter 3 for each LFTRC alternative.

2.5.2 Potable Water

For all of the LFTRC alternatives, the water demand would be minimal; the required water supply would come from the nearest water distribution pipe (DoD or Guam Waterworks Authority [GWA]) and would be adequate to meet fire water requirements of the Unified Facilities Criteria (UFC).

Potable water service is required for only the KD Rifle Range, KD Pistol Range, and the Range Maintenance and Storage Building. The Range Maintenance and Storage Building would need a sprinkler system and fire protection in accordance with UFC 3-600-01: *Fire Protection Engineering for Facilities* (DoD 2013a). Water demand calculations are based on UFC 3-230-03: *Water Treatment* (DoD 2013b). There are four different types of water demand: (1) domestic uses, (2) industrial uses, (3) fire protection demands, and (4) unaccounted for water (UFW).

Domestic uses include drinking water, household uses, and household lawn irrigation. The LFTRC does not have any residential housing, so the entire domestic demand is based solely on non-resident personnel and civilian employees, with a daily consumption rate of 30 gallons (gal) (113 liters [L]) per day. A total design population of 884 persons was used to calculate demand. The average day demand for the entire LFTRC is 26,520 gal (100,389 L) per day.

To properly size the pipes, the design population must be separated and properly applied to the different locations of the LFTRC. Of the assumed total of 884 personnel, 145 support personnel are required to support the five different ranges (i.e., KD Rifle, KD Pistol, NSSA, MRF, and MPMG Ranges), and the demand for these support personnel would be applied to the Range Maintenance and Storage Building. The remaining 739 personnel would consist of the training personnel on the five ranges. However, it was determined that potable water should only be provided to the KD Rifle Range and KD Pistol Range; therefore, the total demand for the 739 training personnel would be split equally between the two ranges. It is assumed that training personnel from the other ranges would visit either the KD Rifle or KD Pistol Range for water uses, such as filling up canteens or consuming the water at the site.

Industrial uses include water for cooling, irrigation, shops, laundry facilities, air conditioning, wash racks, and boiler makeup. The only industrial demand for the LFTRC would pertain to air conditioning for the Range Maintenance and Storage Building. Although the Range Observation Towers at the perimeter and the Gate House at the ECP would also have air conditioning, the air conditioning units would consist of the smaller, window-type units that only require electricity. The air conditioning requirement for the Range Maintenance and Storage Building is based on an estimated building area of 27,500 ft^2 (2,555 m^2) and an average requirement of 0.05 gal per

minute per ton. This requirement was derived from the cancelled UFC 3-230-19N (DoD 2005), as the new UFC 3-230-03 (DoD 2013b) does not include air conditioning demand guidance. A total industrial load of 0.96 gal (3.6 L) per minute, or 1,375 gal (5,199 L) per day, is required for the Range Maintenance and Storage Building.

Adequate fire protection that complies with UFC 3-600-01 (DoD 2013a) is required for the Range Maintenance and Storage Building. Fire protection and suppression for the five ranges would be provided by fire fighting vehicles such as fire trucks and water tank trucks. It is assumed that a system of fire hydrants would not be needed for protection of the ranges and that a fire fill connection at an accessible location on the LFTRC would be provided. This can be in either the form of a stand pipe or fire hydrant.

UFW is water that is not metered and lost through leakages. The UFC provides no guidance on estimating UFW. Most water utilities, policymakers, and associations, such as the American Water Works Association, deem a 10% to 15% UFW loss as acceptable. Using this as guidance and to be consistent with the demand calculations for the *Guam and CNMI Military Relocation 2012 Roadmap Adjustments Planning Report* (NAVFACPAC 2013a), a value of 15% was used for these calculations for both the domestic and industrial uses. A summary of the calculations is provided in Table 2.5-1.

Table 2.5-1: Estimated Water Demand for the LFTRC

	Domestic	UFW – Domestic	Industrial	UFW – Industrial	Total
Range Maintenance Building	4,350	653	1,375	206	6,584
KD Pistol Range	11,085	1,663	—	—	12,748
KD Rifle Range	11,085	1,663	—	—	12,748
Total LFTRC	**26,540**	**3,979**	**1,375**	**206**	**32,080**

Source: Provided by AECOM.
Note: All measurements in gallons per day.
Legend: KD = known distance; LFTRC = Live-Fire Training Range Complex; UFW = unaccounted for water.

2.5.3 Wastewater

Wastewater requirements for the LFTRC would be minimal as the Range Maintenance and Storage Building would be the only LFTRC facility requiring sewer service. Any existing sewer in proximity to the LFTRC is assumed to have adequate capacity. Portable toilets would be provided at each of the ranges.

2.5.4 Information Technology/Communication

The LFTRC would be connected to the Main Cantonment with a duct bank consisting of six 4-inch (10-centimeter [cm]) diameter conduit. Where the routing is off base, the duct bank would be encased in concrete and provided with lockable manholes. Where routing is on base, the duct bank would be encased in concrete only when under roadways or parking lots and would not require locking manholes. The depth of the duct bank would be a minimum 2 ft (0.6 m) below ground surface. For redundancy, the LFTRC would also be provided with a wireless system of communications with the Main Cantonment.

2.6 LIFE CYCLE COST

A comprehensive Life Cycle Cost Analysis (LCCA) was submitted in June 2013 as a separate report, *Life Cycle Cost Analysis, Marine Corps Relocation* (NAVFACPAC 2013b). The LCCA covers the development of the Main Cantonment and the LFTRC. The LFTRC life cycle costs are summarized in this report.

The purpose of the LCCA was to develop comparative costs of the alternatives to facilitate decision-making. For this reason, with the exception of initial construction costs, costs that are common across all alternatives were disregarded for the purpose of the comparative study. These costs are often referred to as "wash costs," and examples include costs associated with the non-live-fire training at Andersen South and operational costs associated with the ranges. Certain costs vary among the alternatives, such as the costs for fire/law enforcement and security, or service contract work related to road and grounds maintenance. Where material differences exist, the costs were evaluated in the LCCA. For the purpose of the LCCA, material or substantial refers to a cost that is sufficient to influence the relative ranking of the alternatives.

The findings of the LCCA provided only cost analyses; benefits or advantages of the alternatives were not considered, nor were non-cash impacts, such as overall operational efficiency or productivity differences among alternatives.

The LCCA for the LFTRC considered the following elements (Table 2.6-1):

- **Initial Investment:** Includes buildings, utilities and site improvements, off-site improvements, easement acquisition, and environmental/cultural mitigation.
- **Sustainment:** Covers all routine maintenance and repair of facilities, including periodic replacement of equipment or components. Sustainment preserves, but would not extend, the total useful service life of the asset.
- **Relinquished Land Value:** Includes the value of land given to the Government of Guam (GovGuam) in accordance with the stated net-negative land acquisition commitment, which states that any land acquired for the program will be offset by donation of an equivalent or greater acreage of land to GovGuam, such that there is no net increase in DoD land ownership as a result of the Marine Corps relocation.
- **Major Replacement:** Includes replacement of assets at the end of their economic life, where the economic life is less than the term of the analysis.
- **Terminal Value:** The remaining value of facilities at the end of the 32-year project period.

Table 2.6-1: Life Cycle Costing for the LFTRC

Life Cycle Cost Elements (Discounted)	NWF	RT 15A	NMS North/South	NMS L-Shaped	NMS East/West
Initial Investment	$416,412,000	$552,417,000	$637,808,000	$529,463,000	$331,999,000
Sustainment	$66,076,000	$63,691,000	$59,916,000	$75,425,000	$55,761,000
Relinquished Land Value	$0	$74,686,000	$21,356,000	$80,755,000	$135,973,000
Major Replacement	$523,000	$517,000	$517,000	$505,000	$506,000
Terminal Value	-$20,868,000	-$82,065,000	-$23,562,000	-$69,974,000	-$78,910,000
TOTAL	**$462,143,000**	**$609,246,000**	**$696,035,000**	**$616,174,000**	**$445,329,000**

Source: Provided by AECOM.

2.7 CONSTRUCTION PHASING PLANS

A construction phasing plan has been developed and is described for each alternative in Chapter 3, with construction phasing timelines presented in Appendix A. The phasing plans assume a ROD in March 2015 and forecast when each LFTRC alternative would achieve its Initial Operational Capability (IOC) to support Marine live-fire training. The phasing plans consider the following: development of design/build packages; land acquisition (where required); land surveys; grading; utilities and road development; vertical (buildings) construction; and construction of relocated or replacement facilities (where required).

The construction phasing plans were developed using the following assumptions:

- The following are the three contract packages:
  - Hand Grenade Range (funding in Fiscal Year [FY] 2016).
  - KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
  - MPMG Range (funding in FY 2017).
- The KD Rifle, KD Pistol, MRF, and NSSA Range package is assumed to include an access road, area roads, a range maintenance building, any common facilities required to render these ranges functional (such as overwater Range Observation Towers), and associated utilities that extend to the direct access roads of other ranges.
- For the NMS L-Shaped and North/South alternatives, munitions storage construction is assumed to occur in parallel with range construction.
- Abandoned munitions storage units would not be demolished.
- The transfer of munitions from old to new units would happen concurrently with storage unit construction and range construction. It is assumed that one unit per week can be transferred.
- As ranges are constructed, they would be functional upon completion and within the allotted funding.
- Vertical construction would delay excavation, utilities, and roads by 4 months for all alternatives and would not include new munitions storage facilities.
- The excavation productivity assumptions may need to be adjusted for difficult terrain and would not include Munitions and Explosives of Concern (MEC) or vegetation clearance.
- Property acquisition durations were provided by Naval Facilities Engineering Command Pacific (NAVFACPAC) and worst-case scenarios were used in the schedules.
- Excavation productivity summarized in Table 2.7-1, below.

Table 2.7-1: Estimated Excavation Productivity

Quantity Range (Total)	Daily Volume
Large Quantities (above 100,000 cubic meters [m^3])	3,500 m^3/day
Medium quantities (10,000 to 100,000 m^3)	1,000 m^3/day (with trenching) 2,000 m^3/day(without trenching)
Small quantities (below 10,000 m^3)	400 m^3/day (with trenching) 800 m^3/day (without trenching)

Source: Provided by AECOM.

3 CONCEPTUAL DEVELOPMENT PLANS FOR THE LIVE-FIRE TRAINING RANGE COMPLEX

3.1 INTRODUCTION

The purpose of these LFTRC CDPs is to visually demonstrate land use, functional relationships, access, building footprints and massing, utility corridors, sustainability features, and the overall built environment experience associated with each of the LFTRC alternative sites. The CDP process allows the design of all of the interrelated elements and features associated with the creation of a new training complex. The CDP process also facilitates comparison by applying holistic and consistent criteria to each of the alternatives. To ensure a comprehensive approach, utilities, infrastructure, and sustainability planning efforts were integrated with all aspects and at each stage of the planning process.

Each of the CDPs aimed for optimum consistency with the Marine Corps mission, Guiding Principles, Vision Statement, applicable UFC, and Marine Corps development policies, goals, and mandates, while minimizing impacts on existing tenant operations, where applicable.

The CDP process involved continuous stakeholder engagement, decision-maker briefings, and collaborative concurrence throughout the stages of plan refinement. An overarching outcome of this planning process, in general, and the CDP staged development in particular, is to inform the decision-making process in the identification of a Preferred Alternative that will be used in the SEIS and to document that process of selection.

The following chapter outlines the baseline conditions of the five alternative sites (i.e., NWF, RT 15A, NMS North/South, NMS L-Shaped, and NMS East/West), including natural and man-made constraints; proposed utilities and infrastructure improvements; and consistency with Marine Corps guidance and criteria. Based on the specifics of each CDP developed, this chapter then summarizes life cycle cost (LCC) and construction phasing plans for each of the five LFTRC alternatives. In addition, the Hand Grenade Range is considered a stand-alone alternative and would be implemented regardless of which LFTRC alternative is eventually selected. The Hand Grenade Range alternative is therefore presented as an independent section at the end of the chapter.

3.2 NORTHWEST FIELD LIVE-FIRE TRAINING RANGE COMPLEX ALTERNATIVE

The NWF LFTRC alternative would be located on the northwest tip of Guam (Figure 3.2-1 and Figure 3.2-2). The ranges and supporting facilities would be located on NWF on AAFB. The composite SDZ (the total of combined individual range SDZs) would extend over the U.S. Fish and Wildlife Service (USFWS) Guam National Wildlife Refuge, Ritidian Point Unit and over the Philippine Sea.

3.2.1 Existing Conditions and Constraints

The Air Force's 36th Wing operates on AAFB, the largest land parcel in the Pacific region comprising approximately 15,423 ac (6,242 ha) of federal government land on Guam. It occupies the northern portion of Guam and extends from the Finegayan boundary on the west to the village of Yigo on the east with the Pacific Ocean as its northern boundary. The NWF area is approximately 4,400 ac (1,776 ha) and consists of two paved expeditionary 10,000 ft (3,048 m) runways with adjacent taxiways and parking areas (Figure 3.2-2). It serves as

the primary maneuver training area at AAFB for field exercises, demolition training, and landing/drop zone operations. NWF is home to the Pacific Air Force's Pacific Regional Training Center (PRTC), 554th Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers (RED HORSE) Squadron, 254th RED HORSE Squadron, and 644th Combat Communications Squadron. The PRTC conducts approximately ten Commando Warrior Training Courses per year, with each course consisting of an estimated 150 personnel. Silver Flag expeditionary service support training exercises would be hosted at NWF commencing in 2014. Eight Silver Flag exercises are planned per year, with each training exercise consisting of approximately 144 personnel. The 2010 Guam Relocation FEIS ROD identified NWF as the location for weapons emplacements for the Army Missile Defense Task Force if a future decision is made to construct and operate the unit on Guam.

Source: AECOM 2010.

Figure 3.2-1: Aerial View of NWF

On the northern boundary of NWF, the USFWS Ritidian Point Unit of the Guam National Wildlife Refuge encompasses the shoreline area below the cliff line. Access to the Refuge is via Route 3A through DoD real property under an agreement between GovGuam and the Air Force. Private lands are located to the south and east of the Refuge and are developed at very low density levels, with few permanent buildings. A summary of existing conditions is shown in Figure 3.2-3.

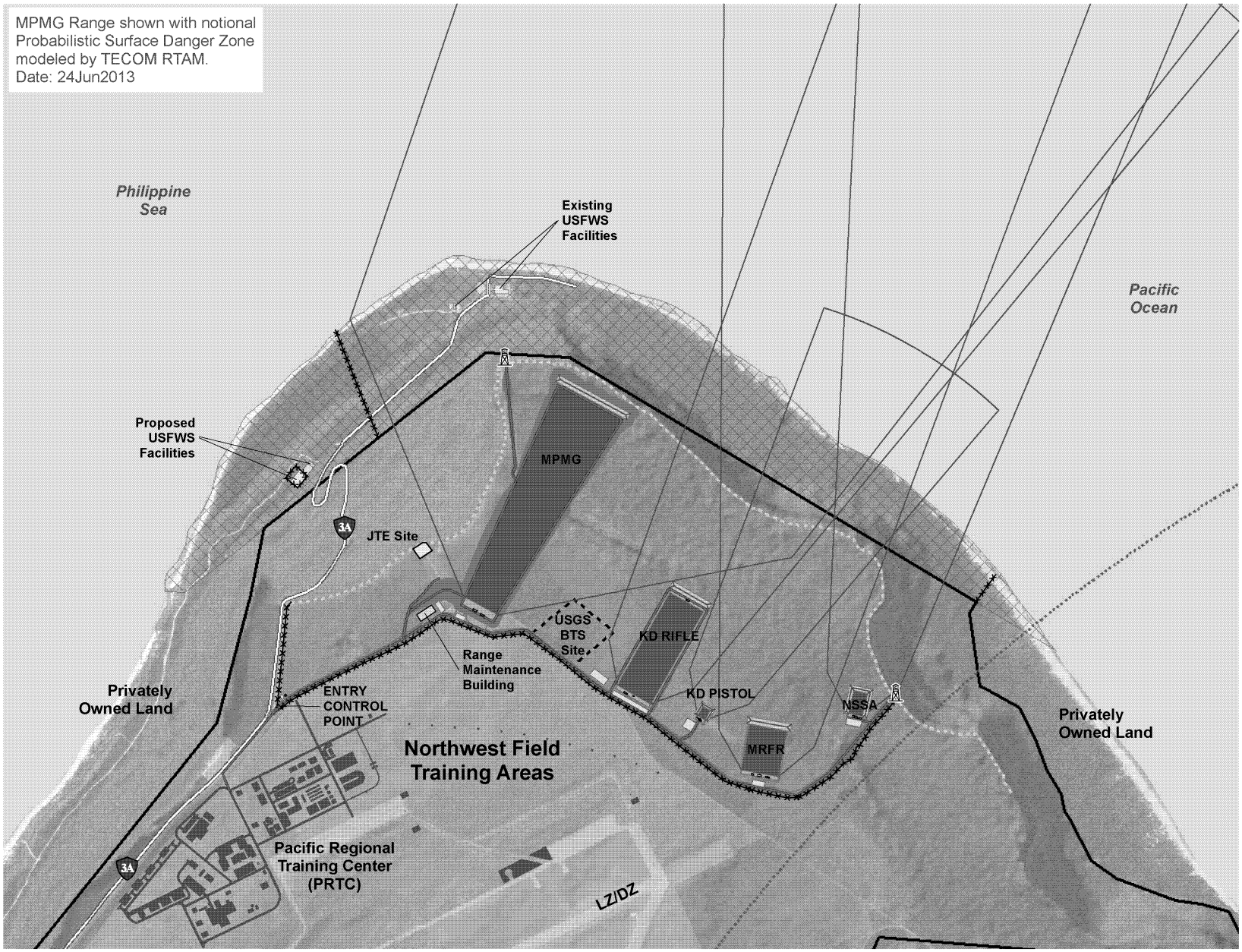


Figure 3.2-2
NWF Alternative

- Range Observation Tower
- Proposed Ungulate Fence Line
- Ritidian Point Encumbered
- Range Parking
- Range Structures
- Range Road
- Berm Area
- Range Support Area
- Surface Danger Zone (SDZ)
- Live-Fire Range Area
- Proposed Grading Contour (5 ft int)
- JTE Site
- Pacific Regional Training Center (PRTC)
- NWF AAFB Training Areas
- Cliffline
- Highway
- Class D Airspace
- USGS BTS Site
- DoD Property
- USFWS GNWR Ritidian Unit

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet
0 300 600 Meters

PREPARED BY: Date: 6/24/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LETRC_Pre-Final Alts Analysis Report\3-2-2 NWF Alternative_24Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

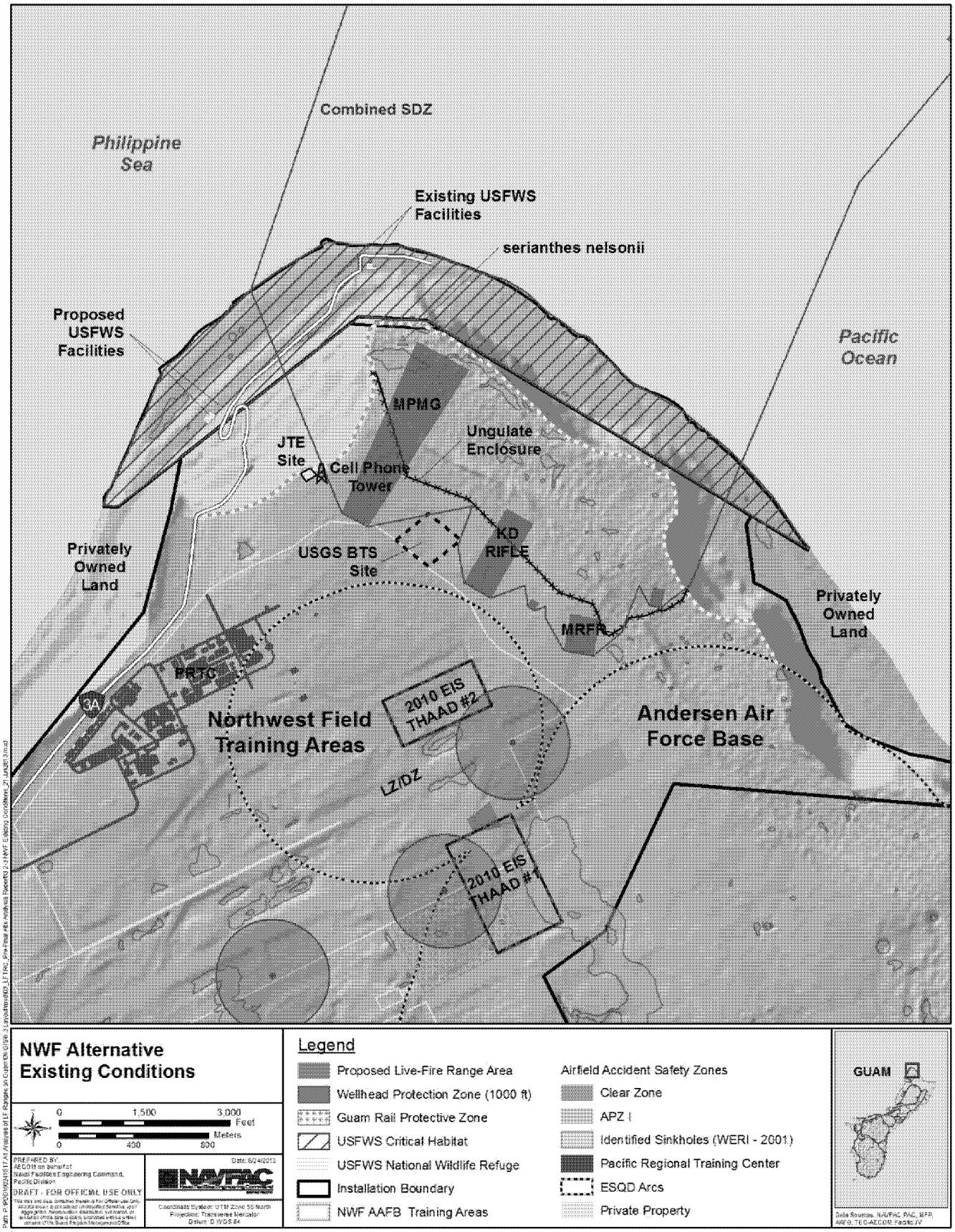


Figure 3.2-3: NWF Alternative Existing Conditions

3.2.2 Land/Sea/Air Space Availability

All range areas and range support facilities are located on existing DoD-owned land at AAFB. SDZs would extend over approximately 264 ac (107 ha) of the USFWS Ritidian Point Reserve, and extend over approximately 3,053 ac (1,236 ha) of the Philippine Sea. No privately owned lands are encumbered by this alternative.

Grading for the NWF alternative is shown in Appendix B and summarized in Table 3.2-1.

Table 3.2-1: Grading Volumes for the NWF Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	1,452,000	1,410,000	42,000	Cut	78
KD Rifle Range	47,440	44,720	2,720	Cut	26
MRF Range	57,130	11,330	45,800	Cut	11
NSSA Range	6,800	8,650	1,850	Fill	2
KD Pistol Range	1,900	2,720	820	Fill	1
Totals	**1,565,270**	**1,477,420**	**87,850**	**Cut**	**118**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend 2,965 ft (904 m) Above Ground Level (AGL). U.S. Marine Forces Pacific (MARFORPAC) has proposed the NWF R-7202 Restricted Area (RA) to deconflict range operations with air traffic. The proposed NWF R-7202 RA would overlay the departure and approach corridors to Guam International Airport Runway 24/06. The Guam International Airport and AAFB VFRs reporting point at Ritidian Point would also be located within the proposed RA. The RA would affect the AAFB radar traffic pattern, circling procedures, minimum/emergency safe altitudes, helicopter rescue response routings, and helicopter Cliff Line Departure pattern; and would impact NWF landing zone and drop zone operations. Deconfliction and mitigation of these impacts would be subject to ongoing actions between the Marines, Air Force (36th Wing), and FAA.

3.2.3 Supporting Infrastructure

To take advantage of existing NWF security operations, proposed entry to the LFTRC would be through the existing NWF Gate off of Route 3A. Traffic would be routed along existing NWF roads to an existing road that would be improved to support LFTRC traffic. An internal LFTRC ECP would be constructed to control range access during hours of operation. Approximately 5.4 miles (mi) (8.8 km) of range roads would be improved/constructed to support internal LFTRC traffic.

Power to the site would extend from the existing three-phase 13.8 kV overhead line that serves Building 322 and Building 337. This overhead line (Circuit P-110) would be intercepted near or at Pole NG-146 to provide single-phase primary power to the various facilities.

At or near pole NG 139, a single-phase 13.8 kV line would tap onto the existing overhead line and transition to an underground line to serve the ranges and Range Maintenance Building. A 10 kVA pad-mounted transformer would be located near each Range Operations Tower to transform the 13.8 kV line to 120/240 V.

The utilities plans for the NWF LFTRC alternative are depicted in Figure 3.2-4 through Figure 3.2-7.

3.2.4 Land Use Compatibility

The NWF LFTRC alternative was developed in coordination with AAFB representatives during an August 2012 site visit and revised after meetings with AAFB representatives in April 2013. Ranges were sited to minimize

impacts on the Air Force's existing PRTC, Landing Zone, and RED HORSE Squadron operations at NWF. The NSSA Range was re-sited to deconflict range operations with the Air Force's planned Milky Way site for its Joint Threat Emitter (JTE). The position of the SDZs would cause the relocation of the existing USFWS Ritidian Point Unit Administration Building and Visitors' Center and a reduction in the Wildlife Unit area that can be accessed by the public. An alternate location for the USFWS facilities has been identified by Naval Facilities Engineering Command Pacific and is shown on Figure 3.2-2.

An Operational Noise Assessment of the NWF alternative, conducted by the U.S. Army Public Health Command (USAPHC), concluded that the Noise Zones (as shown and defined on Figure 3.2-8) would be generally contained within the AAFB boundary, the proposed LFTRC, or Department of Interior land. Based on available imagery, the remaining off-base areas within the Noise Zones are undeveloped and would not contain any noise-sensitive land uses. Within NWF, Zone 1 would extend to the PRTC and would be compatible with PRTC operations. Noise levels above 65 decibel (dB) A-weighted Day-Night Level (ADNL) (Zones 2 and 3) would not encompass any noise-sensitive land uses on AAFB.

3.2.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.2-9 and Figure 3.2-10). The significance of the impacts and potential mitigation listed in this report would be addressed in the SEIS. All construction and operation activities have the potential to increase the biological impacts associated with the spread of invasive species, with resulting threats to special-status species.

The NWF alternative would impact the following terrestrial biological resources:

- Clearing of primary limestone forest and large numbers of the Guam Species of Greatest Conservation Need (SOGCN) cycad fadang (*Cycas micronesica*). Primary limestone forest serves as potential habitat for special-status species. A large area of limestone forest at the MPMG Range that is relatively undisturbed and not substantially impacted by ungulates would be removed.
- Removal of large areas of the Guam National Wildlife Refuge Overlay (Overlay Refuge), which would reduce natural resource conservation benefits.
- Restricted access to over half of the terrestrial land area of the Guam National Wildlife Refuge, which would affect refuge conservation efforts, including conservation and monitoring efforts and public outreach for ESA-listed and Guam-listed species.
- Clearing of suitable habitat used by the ESA-listed Mariana fruit bat and disturbance of suitable habitat that could be used by the fruit bat in additional areas around the LFTRC.
- Possible mortality of the candidate ESA Mariana eight-spot butterfly, which has been documented in the LFTRC developed area.

Biological impacts would include the following:

- Impacts on the Mariana fruit bat from activity and noise.
- Invasive species impacts on all special-status species.

For cultural resources, construction of the NWF alternative would potentially result in direct impacts on 21 sites eligible for listing on the National Register of Historic Places (NRHP). One site and two structures have not been

evaluated for listing on the NRHP. In addition, indirect impacts on as many as 38 NRHP-eligible archaeological sites could occur during operations.

3.2.6 Public Access

Public access would be prohibited to the portions of the Ritidian Point Unit and nearshore waters encumbered by the SDZ when the LFTRC ranges are active.

3.2.7 Range Transients

The existing controlled access to AAFB would greatly reduce the possibility of unauthorized personnel on the portions of the range complex on AAFB. Proposed fencing on Ritidian Point would prevent unauthorized persons from entering the SDZ encumbering the Ritidian Point Unit.

Watercraft may inadvertently enter portions of the SDZ that extend over nearshore waters. The two proposed Range Observation Towers would provide surveillance of the nearshore SDZ, and live-fire training would cease if the SDZ is penetrated by watercraft. The visual coverage of the Range Observation Towers is shown in Figure 3.2-11. Live-fire training may resume once the watercraft clears the SDZ.

If approved by the FAA, the proposed NWF R-7202 RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, training would cease until the aircraft is clear of the SDZ.

3.2.8 Operational Efficiency

The proposed NWF alternative would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.

3.2.9 Orientation

The generally northern orientation of the ranges would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun.

3.2.10 Life Cycle Cost

The life cycle cost for the NWF alternative is $462,143,000. See Table 2.6-1 for cost breakdown.

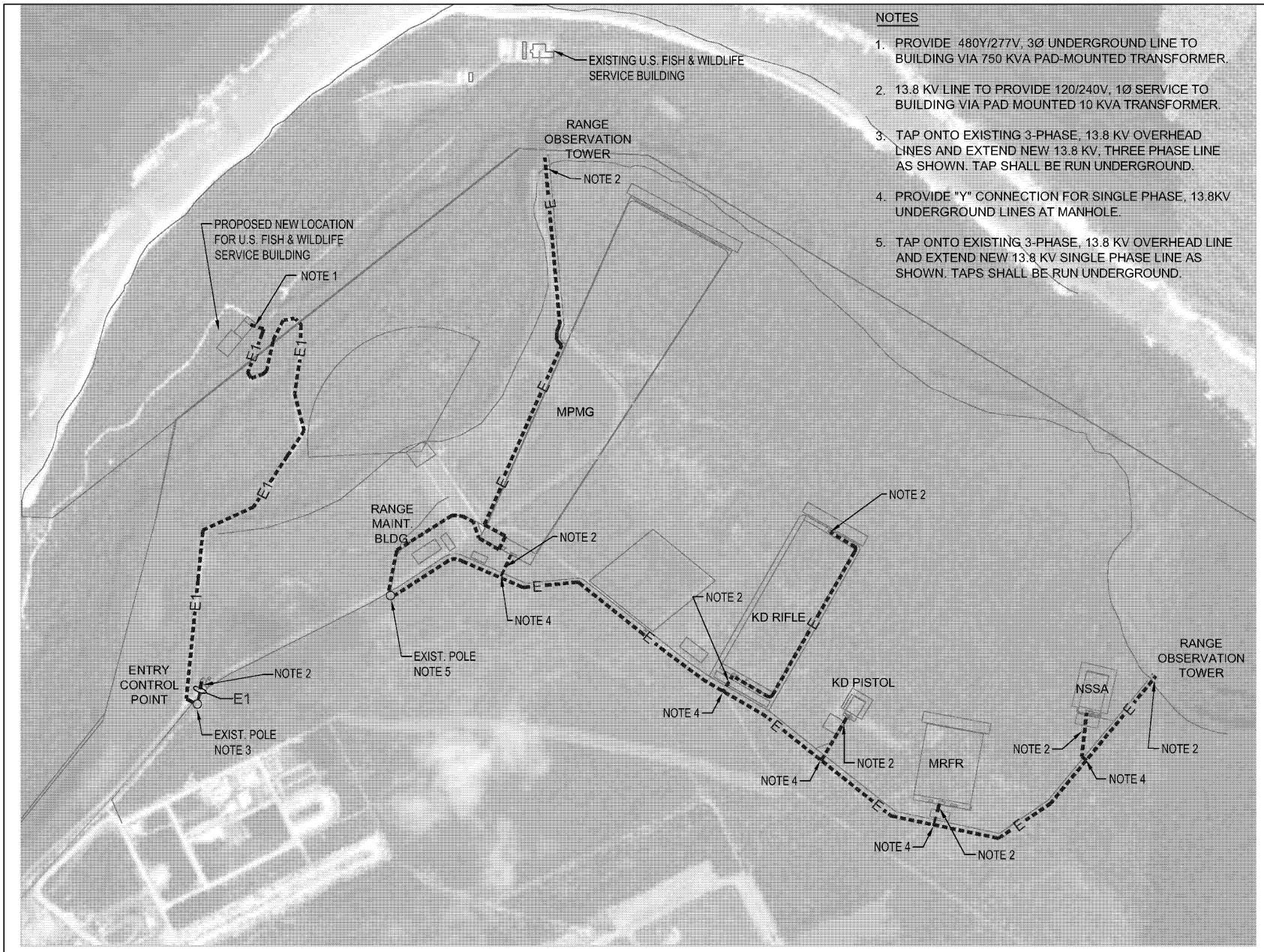
3.2.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the NWF alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges — October 2018
- MPMG Range — May 2019



NOTES

1. PROVIDE 480Y/277V, 3Ø UNDERGROUND LINE TO BUILDING VIA 750 KVA PAD-MOUNTED TRANSFORMER.
2. 13.8 KV LINE TO PROVIDE 120/240V, 1Ø SERVICE TO BUILDING VIA PAD MOUNTED 10 KVA TRANSFORMER.
3. TAP ONTO EXISTING 3-PHASE, 13.8 KV OVERHEAD LINES AND EXTEND NEW 13.8 KV, THREE PHASE LINE AS SHOWN. TAP SHALL BE RUN UNDERGROUND.
4. PROVIDE "Y" CONNECTION FOR SINGLE PHASE, 13.8KV UNDERGROUND LINES AT MANHOLE.
5. TAP ONTO EXISTING 3-PHASE, 13.8 KV OVERHEAD LINE AND EXTEND NEW 13.8 KV SINGLE PHASE LINE AS SHOWN. TAPS SHALL BE RUN UNDERGROUND.

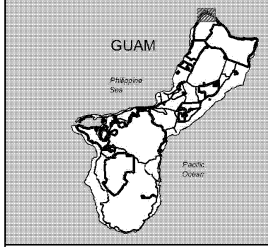
Figure 3.2-4
NWF Alternative Electrical Plan

Legend

- EXIST 13.8 KV, 3Ø OVERHEAD LINE TO REMAIN
- EXIST 13.8 KV, 3Ø OVERHEAD LINE TO BE REMOVED
- NEW 120/240V, 1Ø UNDERGROUND SERVICE TO BUILDING
- E — NEW 13.8 KV, 1Ø UNDERGROUND LINE
- E1 — NEW 13.8 KV, 3Ø UNDERGROUND LINE

*All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 200 m 400 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

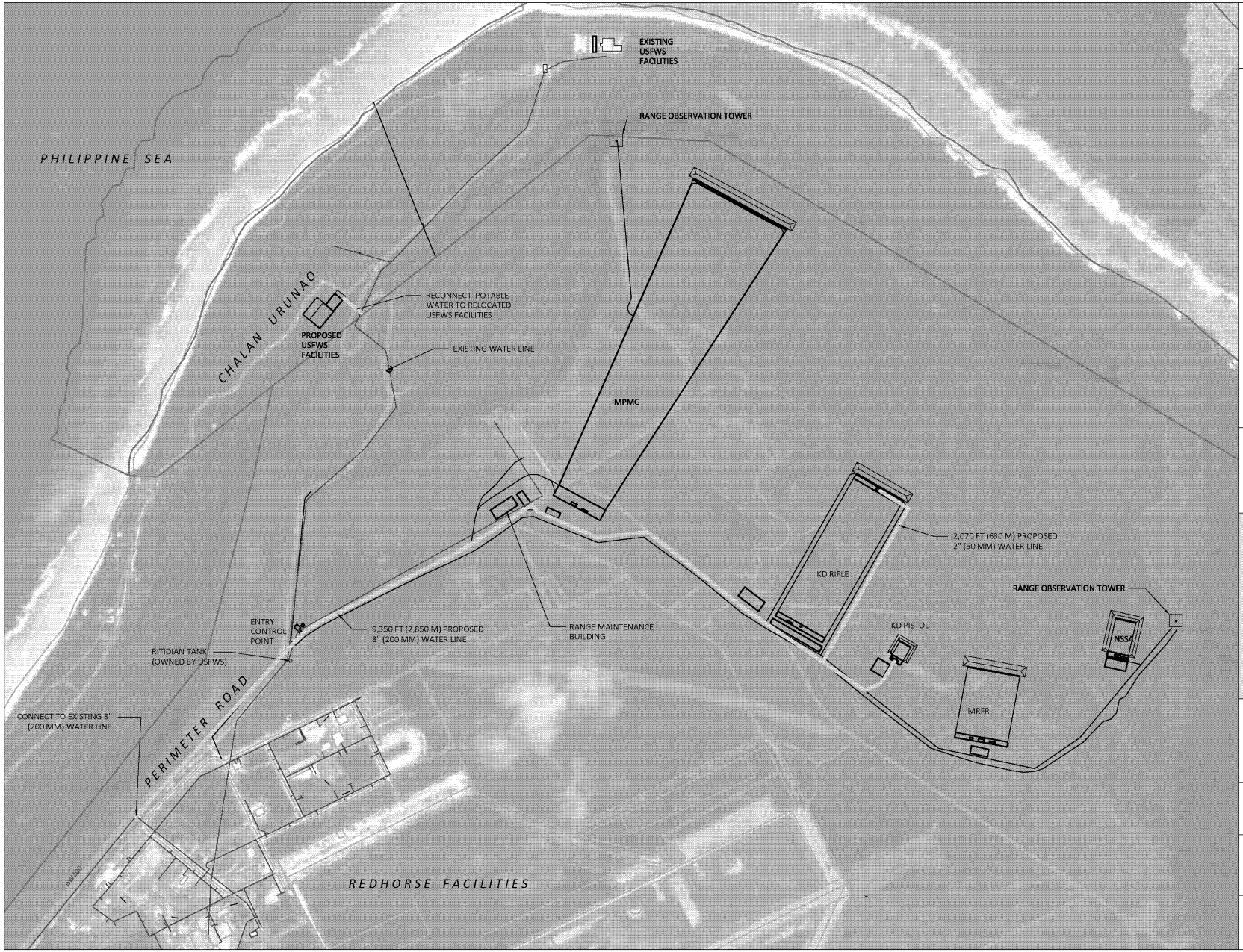


Figure 3.2-5
NWF Alternative Water Plan

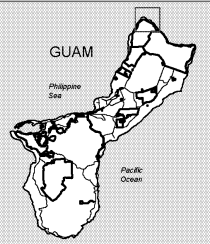
PROPOSED 8" (200 MM) WATER LINE

EXISTING DOD WATER LINE

Potable water service is required for the Range Maintenance Building, KD Pistol Range and KD Rifle Range only.

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 250 500 m

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: June 2013

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

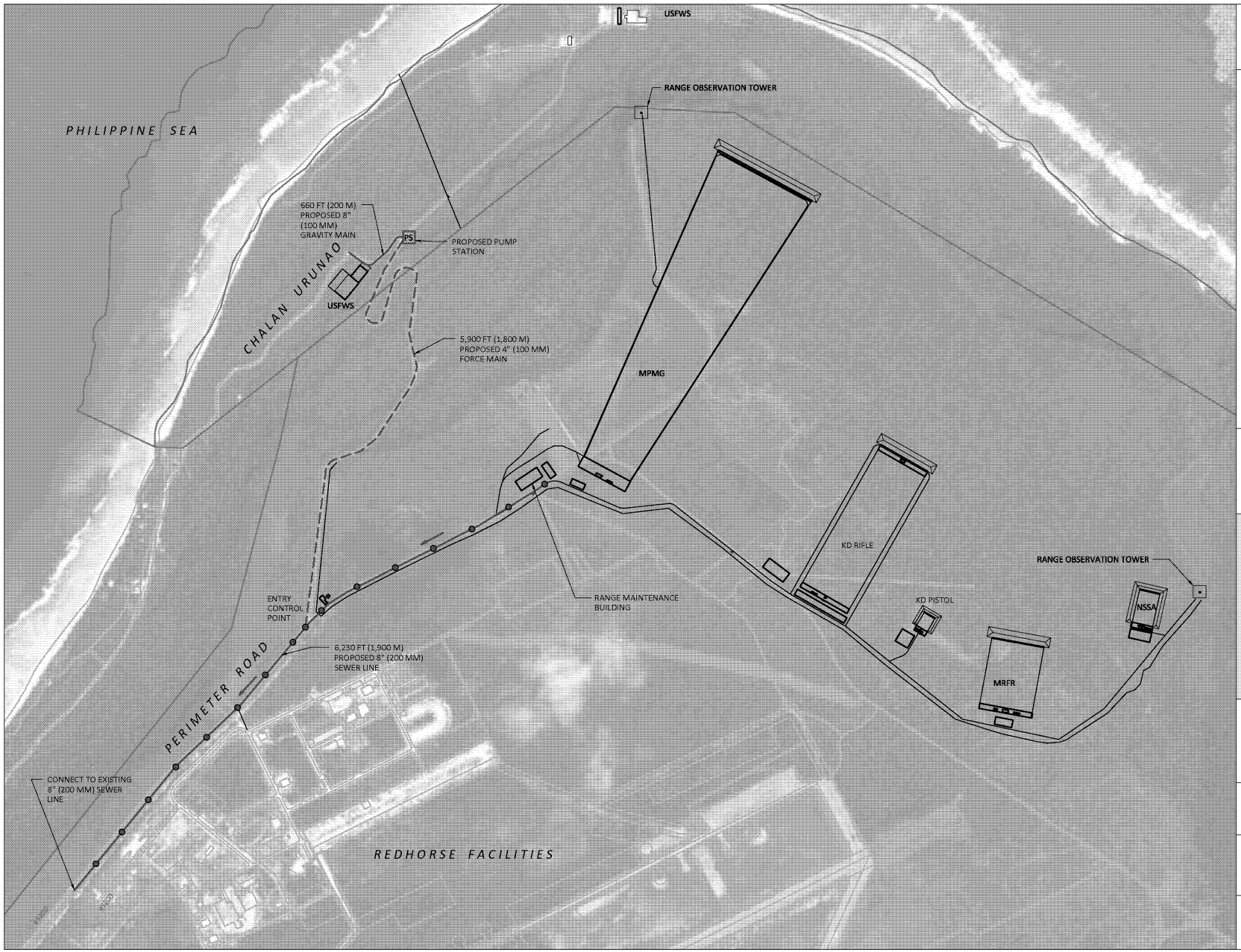


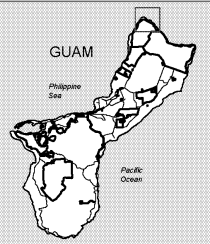
Figure 3.2-6
NWF Alternative Wastewater Plan

- PROPOSED 8" (200 MM) SEWER LINE
- PROPOSED 4" (100 MM) FORCE MAIN
- PS PROPOSED PUMP STATION
- PROPOSED SEWER MANHOLE
- EXISTING DOD SEWER LINE
- EXISTING DOD MANHOLE

Sewer collection is required for the Range Maintenance Building only.

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 250 500 m

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

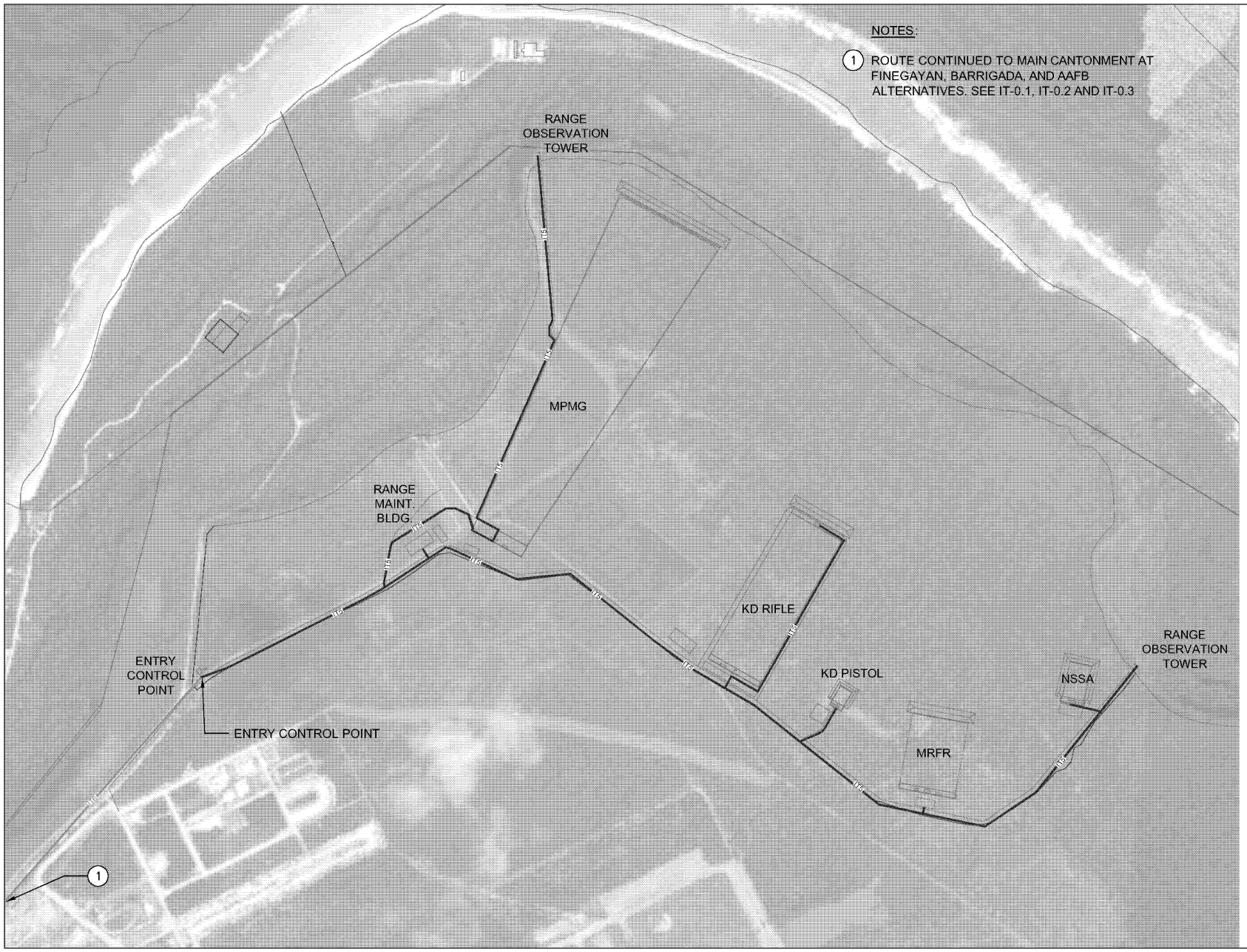


Figure 3.2-7
NWF Alternative
IT/COMM Plan

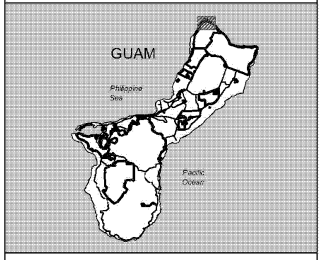
IT5 DISTRIBUTION TO LFTRC - DB1

IT6 USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

DB# DUCT BANK TYPE - SEE DUCT BANK AND CABLE SCHEDULE ON APPENDIX D FOR REQUIREMENTS

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 200 m 400 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

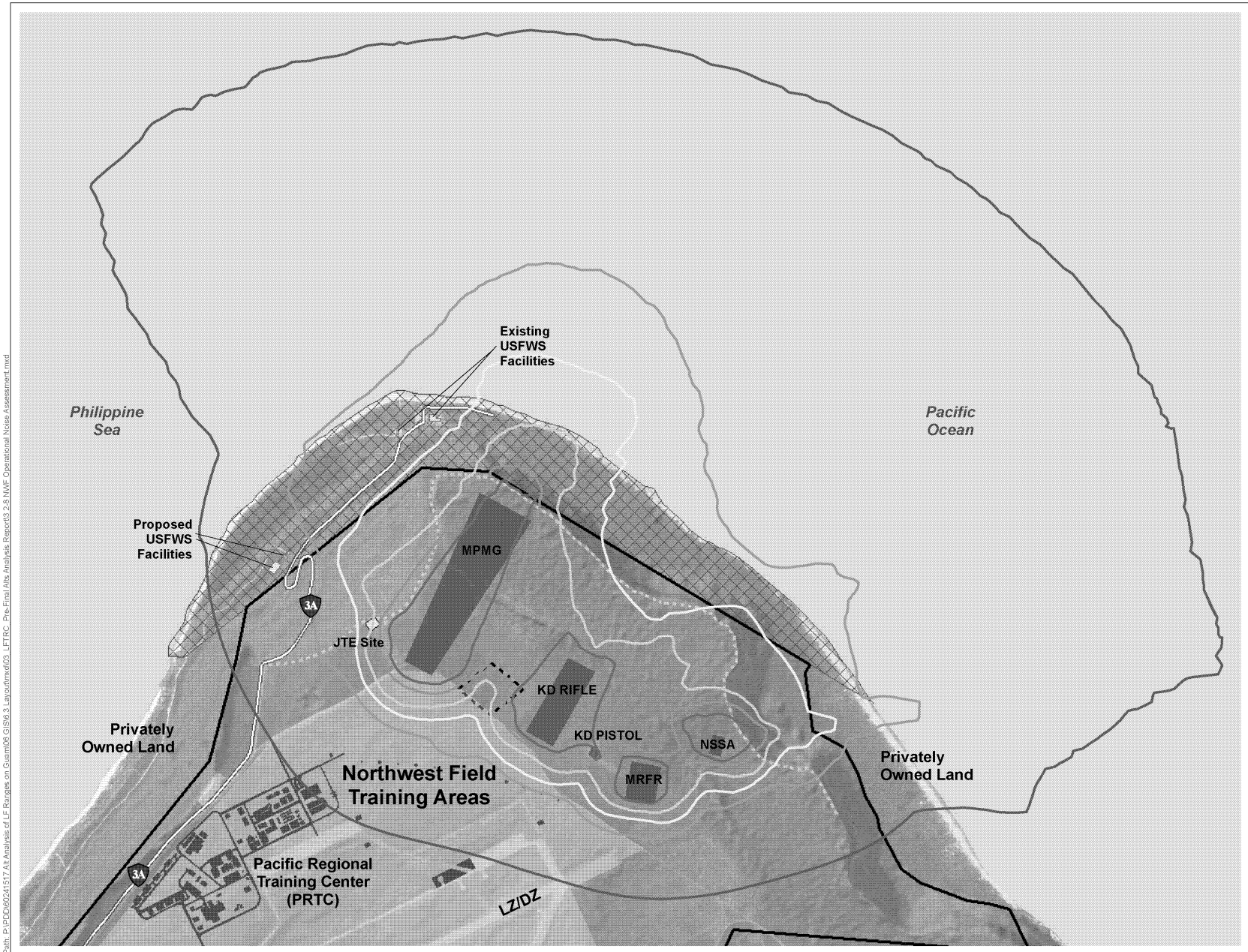


Figure 3.2-8
NWF Alternative Operational Noise Assessment

Small Caliber ADNL Noise Zone

- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Live-Fire Range Area
- JTE Site
- Pacific Regional Training Center (PRTC)
- NWF AAFB Training Areas
- Cliffline
- Highway
- USGS BTS Site
- DoD Property
- USFWS GNWR Ritidian Unit

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet

0 300 600 Meters

PREPARED BY: Date: 6/21/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3-2-8 NWF Operational Noise Assessment.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

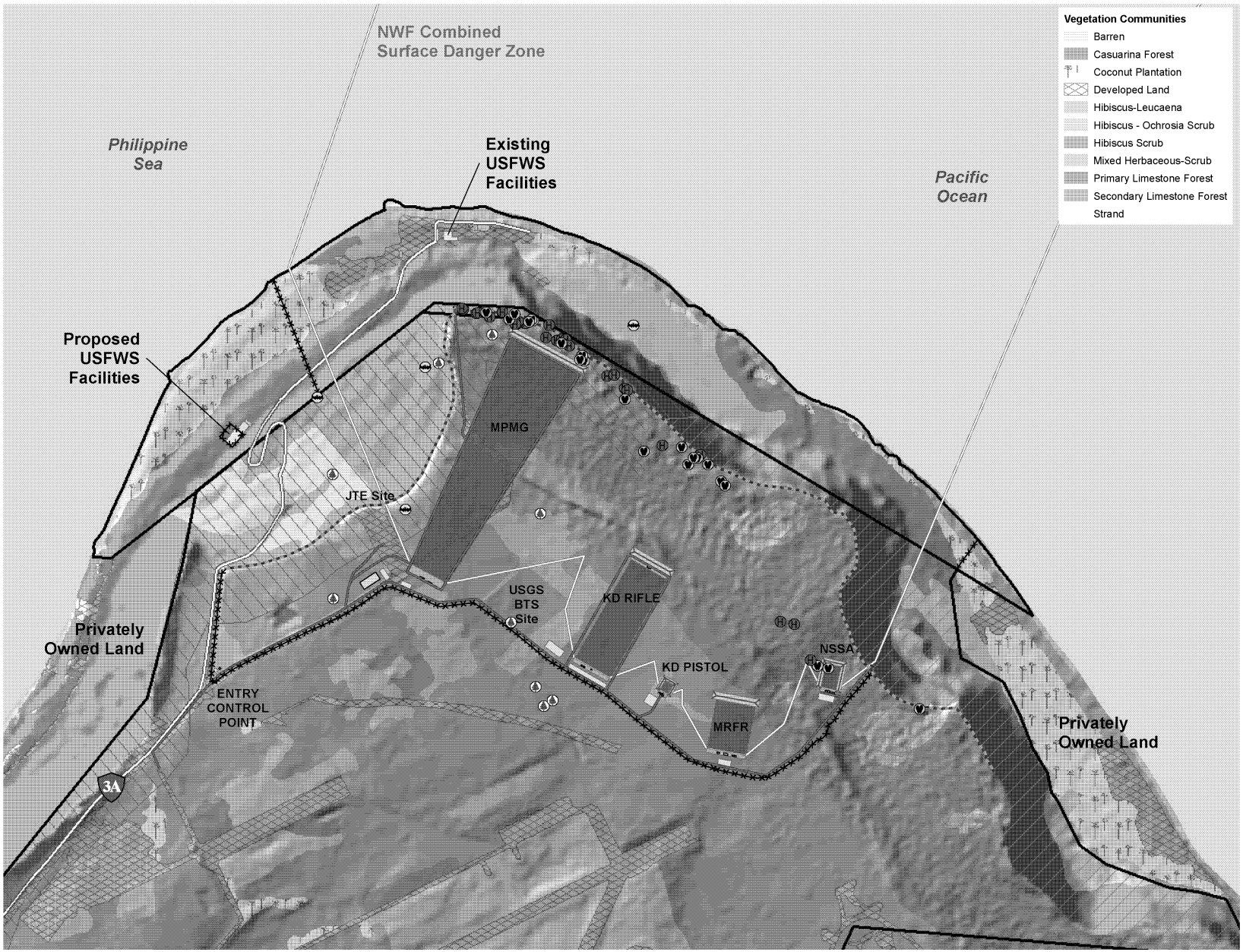


Figure 3.2-9
NWF Alternative Vegetation and Special-Status Species

Special-Status Species Occurrence

Fauna
- Fruit Bat
- Mariana Eight-Spot Butterfly

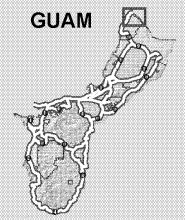
Flora
- Mariana Eight-Spot Butterfly Host Plant
- *Serianthes nelsonii*
- *Tabernaemontana rotensis*

Fruit Bat Roosting Habitat:
- High Priority
- Medium Priority

Proposed Development
- Range Road
- Fence Line
- Berm Area
- Range Structures
- Range Support Area
- Live-Fire Range Area
- Cliffline
- DoD Property

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet

0 300 600 Meters

PREPARED BY: Date: 6/24/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LETRC_Pre-Final Alts Analysis Report\3.2-9 NWF Vegetation Communities_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

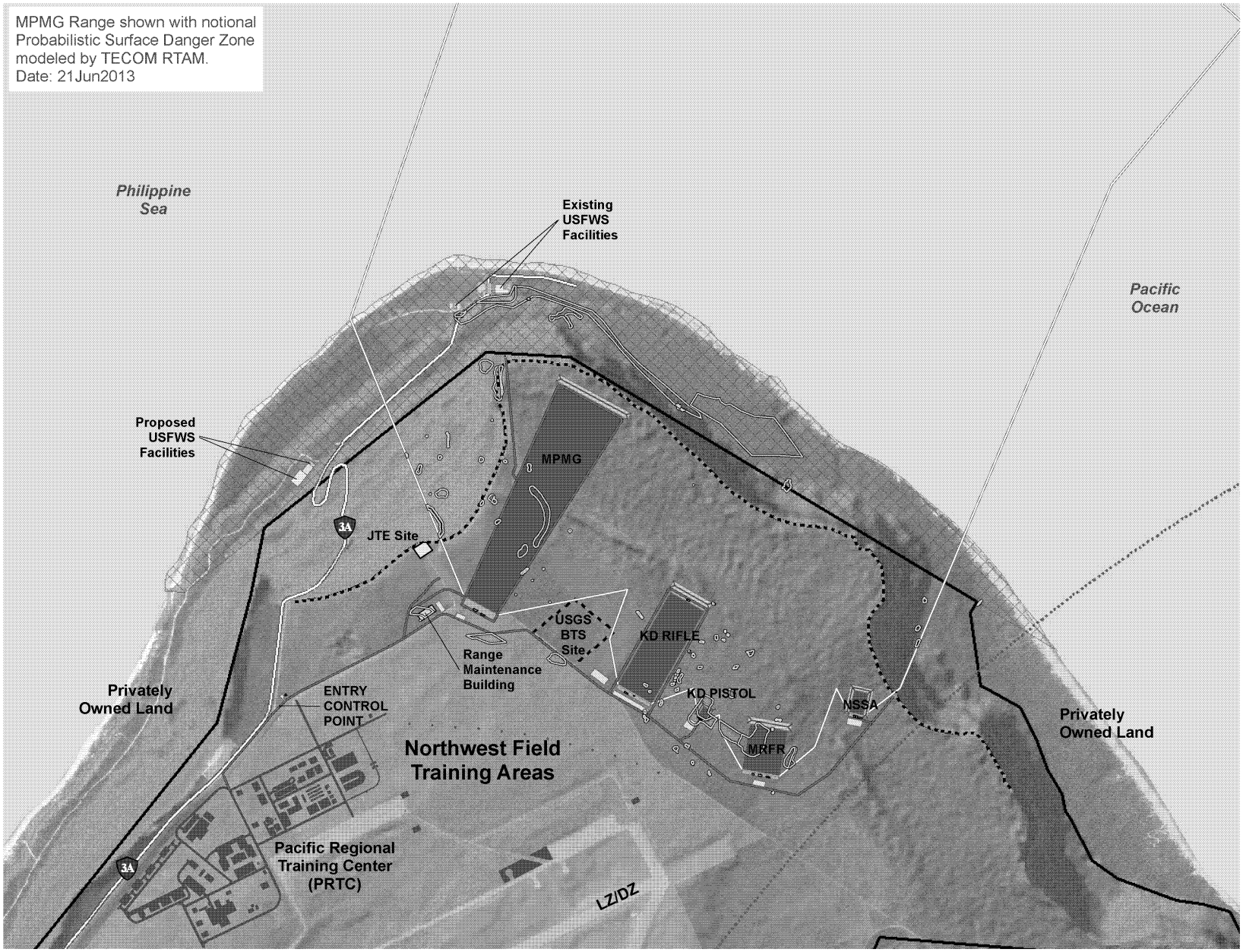


Figure 3.2-10
NWF Alternative
Cultural Resources

- Cultural Resource Area
- Range Parking
- Range Structures
- Range Road
- Berm Area
- Range Support Area
- NWF Combined SDZ
- Live-Fire Range Area
- JTE Site
- Pacific Regional Training Center (PRTC)
- NWF AAFB Training Areas
- Cliffline
- Highway
- Class D Airspace
- USGS BTS Site
- DoD Property
- USFWS GNWR Ritidian Unit

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet
0 300 600 Meters

PREPARED BY: Date: 6/21/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

NAVFAC Naval Facilities Engineering Command

Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3-2-10 NWF Alternative Cultural Resources.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

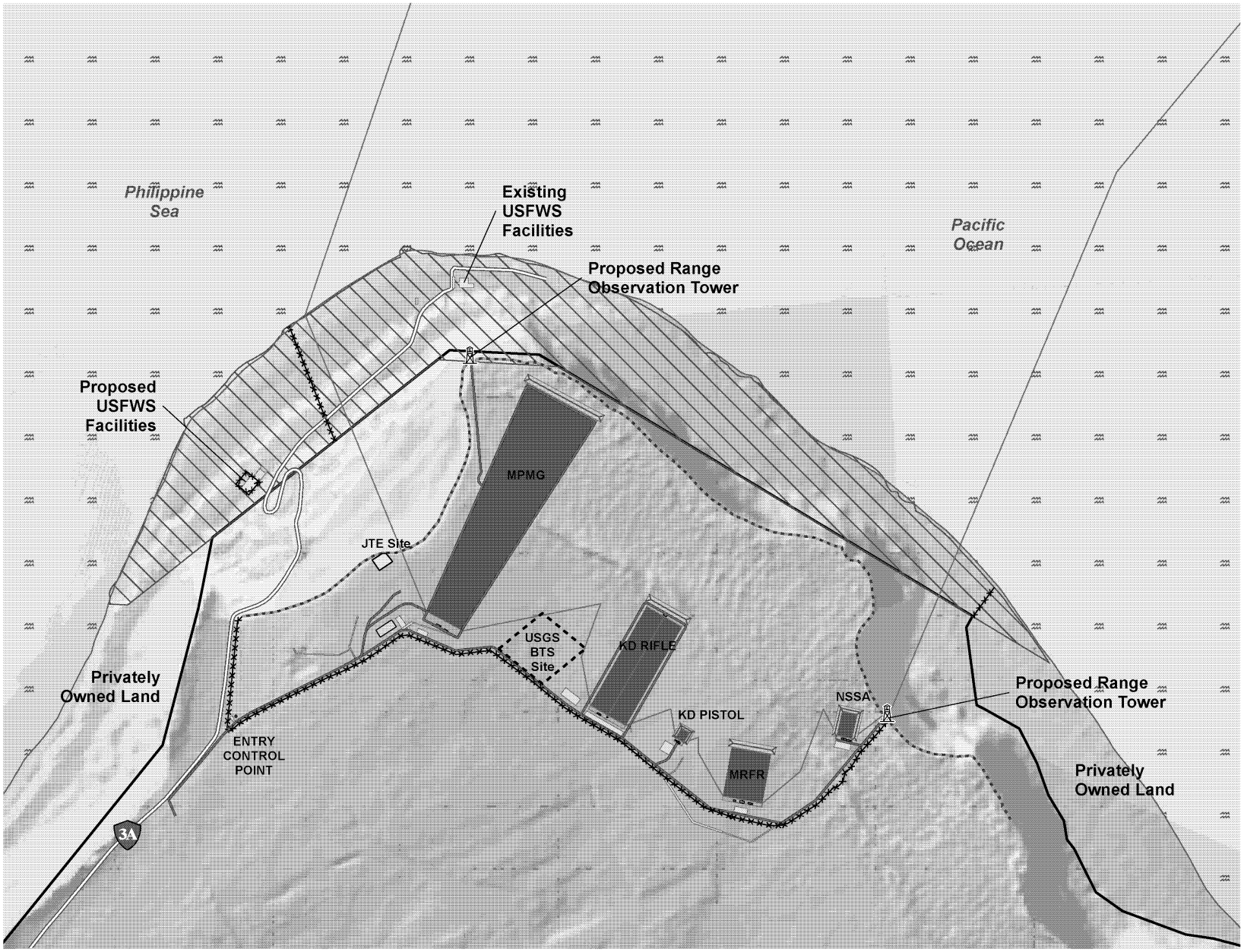


Figure 3.2-11
NWF Alternative Observation Tower Coverage

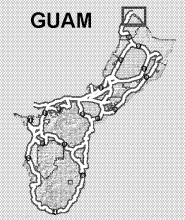
- Range Towers
- Fence Line
- Cliffline
- Highway
- JTE Site
- Open Water (Ocean)
- Range Road
- Range Structures
- Berm Area
- Range Support Area
- NWF Combined SDZ
- Live-Fire Range Area
- DoD Property

Observation Tower Coverage

- Not Visible to 10m Range Tower
- Visible to 10m Range Tower
- Pacific Regional Training Center (PRTC)
- USFWS Ritidian Point NWR

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet

0 300 600 Meters

PREPARED BY: Date: 6/24/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.2-11 NWF Alt OTC_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

3.3 ROUTE 15A ALTERNATIVE

The Route 15A (RT 15A) alternative would be located on the northeast coast of Guam (Figure 3.3-1 and Figure 3.3-2). The ranges and supporting facilities would be located on the plateau adjacent to Andersen South. This alternative would require the relocation of portions of Route 15 to create the necessary space for siting the range complex. The composite SDZ would extend over the Pagat Point archaeological site and over the Pacific Ocean.

3.3.1 Existing Conditions and Constraints

The Route 15 area is located on the eastern coast of Guam and directly east of Andersen South and south of AAFB (Figure 3.3-2). Route 15 parallels the shoreline approximately 1 mi (1.6 km) inland and connects this area to the rest of the Guam road network. This area between Route 15 and the Pacific Ocean is topographically hilly with limited existing development. The dominant development in the area is the Guam International Raceway and the residential communities of Yigo to the north and Mangilao farther south along Route 15. Natural and cultural features in the area include the Pagat Trail, Pagat Cave, Pagat Village, and Pagat Point, all accessed from trailheads at Route 15. The Pagat Trail, Pagat Cave and Village complex are areas of cultural and historical importance and are listed on the NRHP. The DoD-owned Andersen South area contains some abandoned structures and other facilities that are used for non-live-fire training. Surrounding properties in this area are zoned for rural and agricultural uses. A summary of existing conditions is shown in Figure 3.3-3.

3.3.2 Land/Sea/Air Space Availability

The RT 15A alternative would require the acquisition of 872 ac (353 ha) of non-DoD land. The composite SDZ would extend over approximately 83 ac (34 ha) of the Pagat Point Archaeological Reserve and extend over approximately 3,120 ac (1,262 ha) of the Pacific Ocean.

Grading for the RT 15A alternative is shown in Appendix B and summarized in Table 3.3-1.

Table 3.3-1: Grading Volumes for the RT 15A Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	1,800,000	680,750	1,119,250	Cut	80
KD Rifle Range	26,800	880,000	853,200	Fill	35
MRF Range	48,030	305,550	257,520	Fill	13
NSSA Range	23,900	1,440	22,460	Cut	3
KD Pistol Range	4,000	6,900	2,900	Fill	2
Totals	**1,902,730**	**1,874,640**	**28,090**	**Cut**	**133**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend 2,965 ft (904 m) AGL. MARFORPAC has proposed the Andersen South R-7202 (Plateau) RA to deconflict range operations with air traffic.

3.3.3 Supporting Infrastructure

To avoid an increase in traffic on Route 15 and local roads, proposed entry to the LFTRC would be from Route 1 through the existing Andersen South access road. An underpass under the relocated Route 15 would allow access to the internal range road network. Alternate access would be via a second underpass under the Route 15 bypass from the Andersen South MOUT facility.

Power to the site would be from the existing 13.8 kV line near Route 15. An alternative source of power could be the existing GPA-owned 13.8 kV overhead line on concrete poles, which originates from the north on Route 15 and serves the raceway. This existing 13.8 kV line would need to be modified to serve the ranges.

Source: AECOM 2010

Figure 3.3-1: Aerial View of Route 15 Area

Because of the Route 15 realignment, the existing single-phase, 13.8 kV line that feeds the existing buildings south of Route 15 would need to be modified to maintain the proper circuit to the existing buildings.

The utilities plans for the RT 15A alternative are depicted in Figure 3.3-4 through Figure 3.3-7.

3.3.4 Land Use Compatibility

Route 15 would need to be re-routed to create the necessary space to accommodate this alternative. In particular, the MPMG Range would not meet the mandated 3,281 ft (1,000 m) range length required for training without the relocation of the existing roadway.

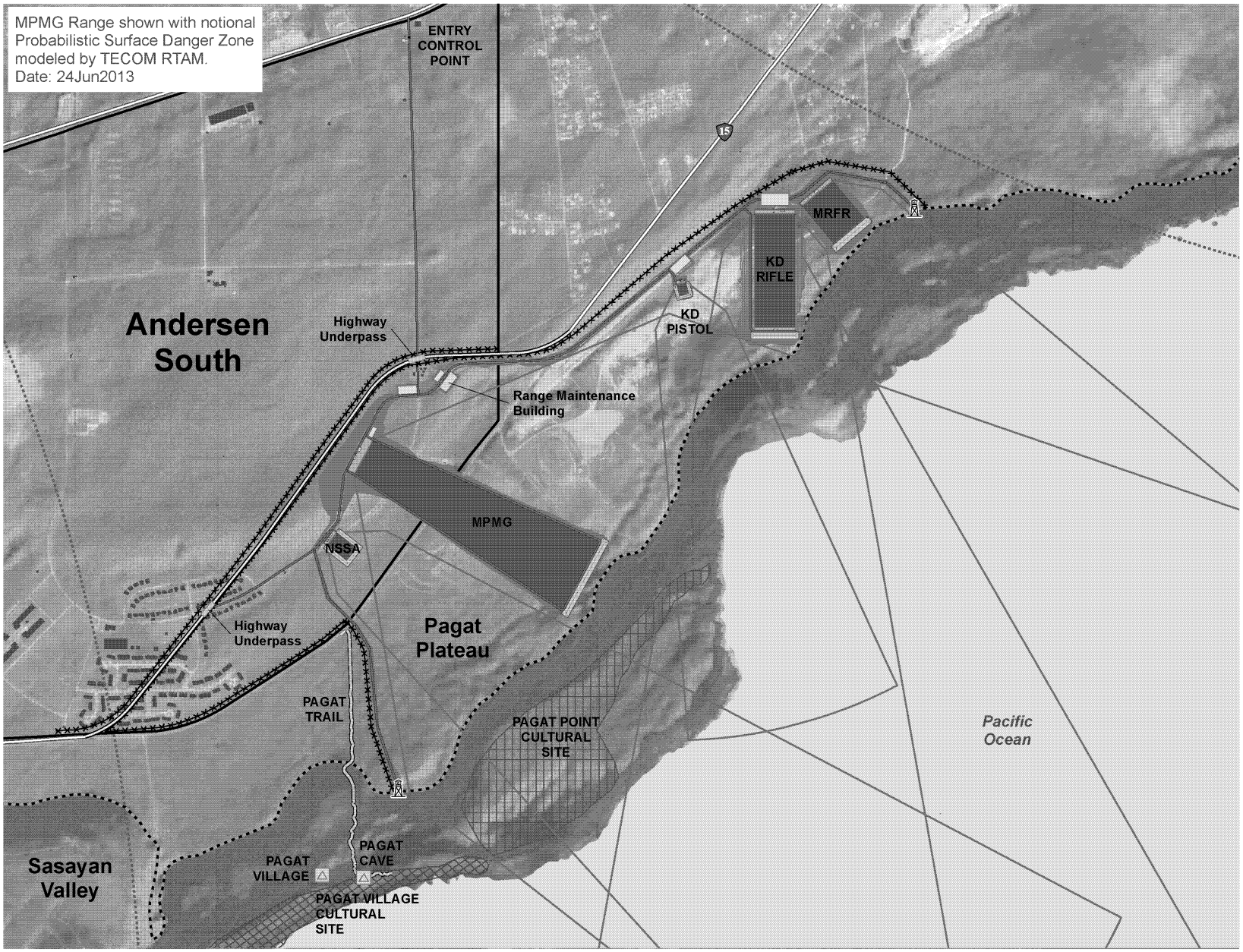
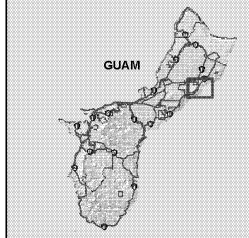


Figure 3.3-2
RT 15A Alternative

- Cultural Landmark
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Range Tower
- Fence Line
- Parking Area
- Proposed Range Road
- Berm Area
- Range Support Area
- Surface Danger Zone (SDZ)
- Live-Fire Range Area
- Proposed Grading Contour (5 ft int)
- Cliffline
- Class D Airspace
- Existing Structure
- DoD Property Line
- Pagat Point Cultural Site
- Pagat Village Cultural Site

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet
0 250 500 Meters

PREPARED BY: Date: 6/24/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Date: 6/24/2013 Path: P:\PDI\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.3-1 RT 15A Alternative_24Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

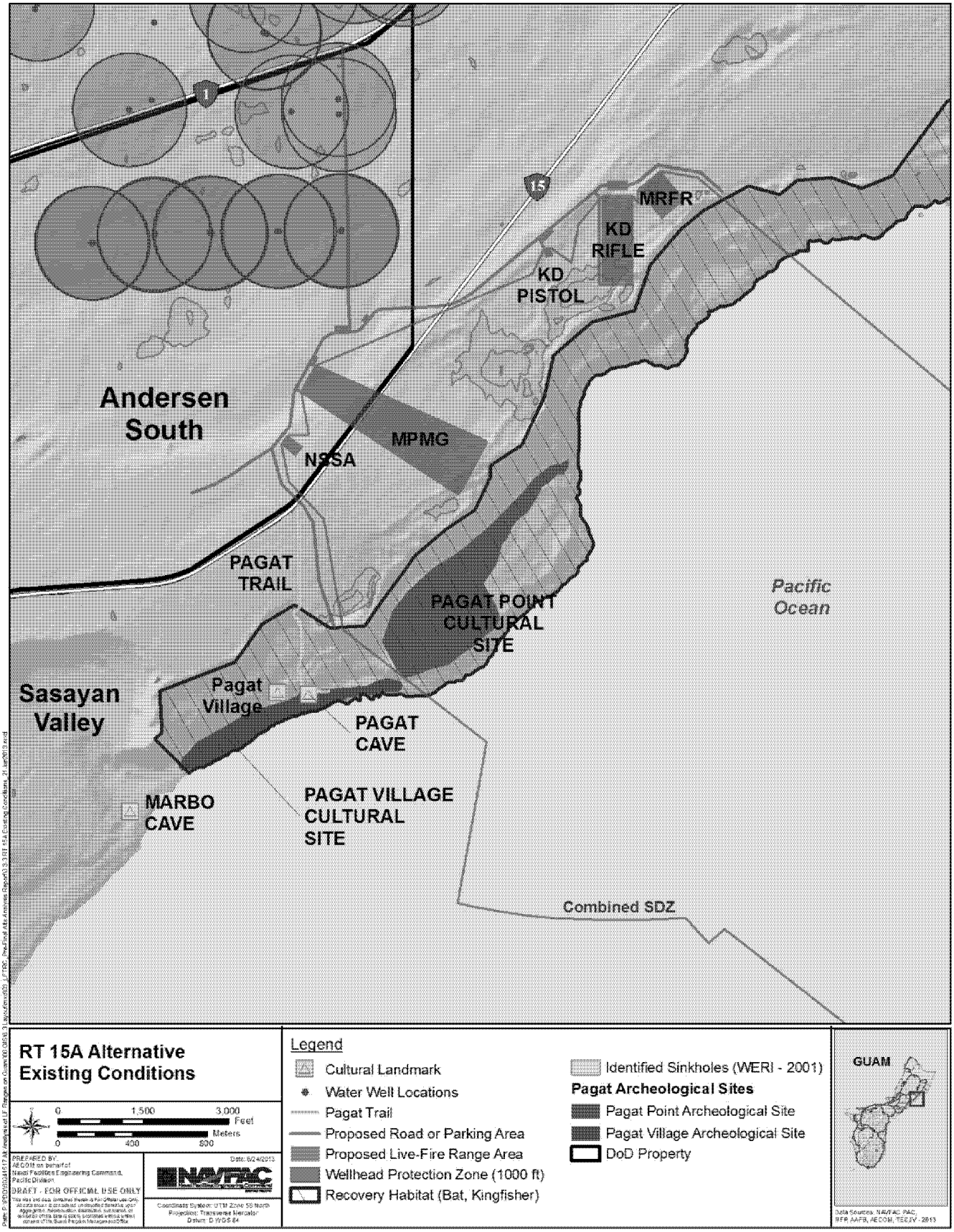


Figure 3.3-3: RT 15A Alternative Existing Conditions

THIS PAGE INTENTIONALLY LEFT BLANK

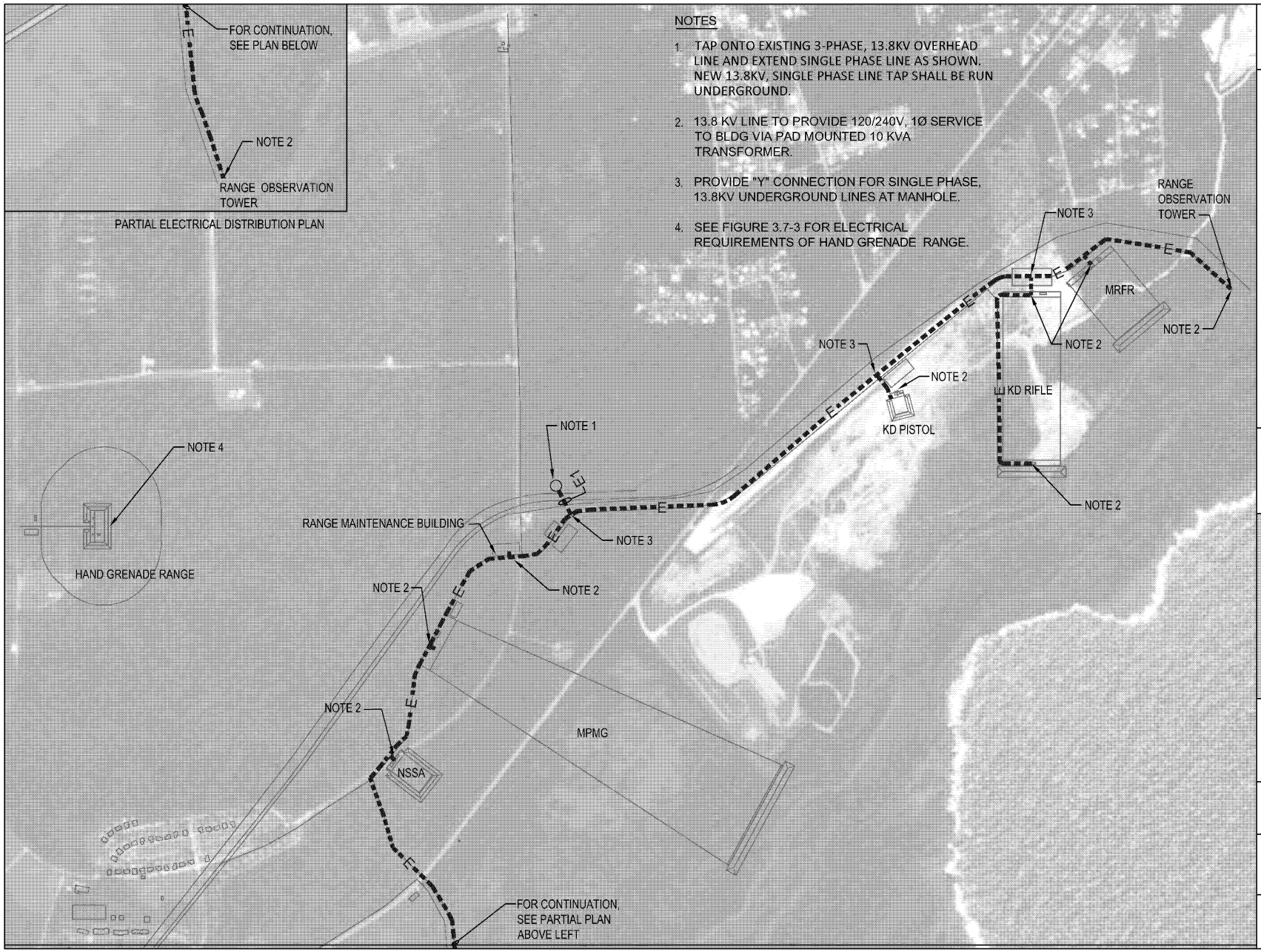


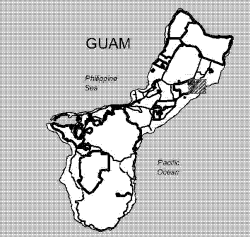
Figure 3.3-4
Route 15A Alternative Electrical Plan

Legend

- NEW 120/240V 1Ø UNDERGROUND LINE FROM PAD MOUNTED 10 KVA TRANSFORMER
- E NEW 13.8 KV, 1Ø UNDERGROUND LINE

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 200 m 400 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

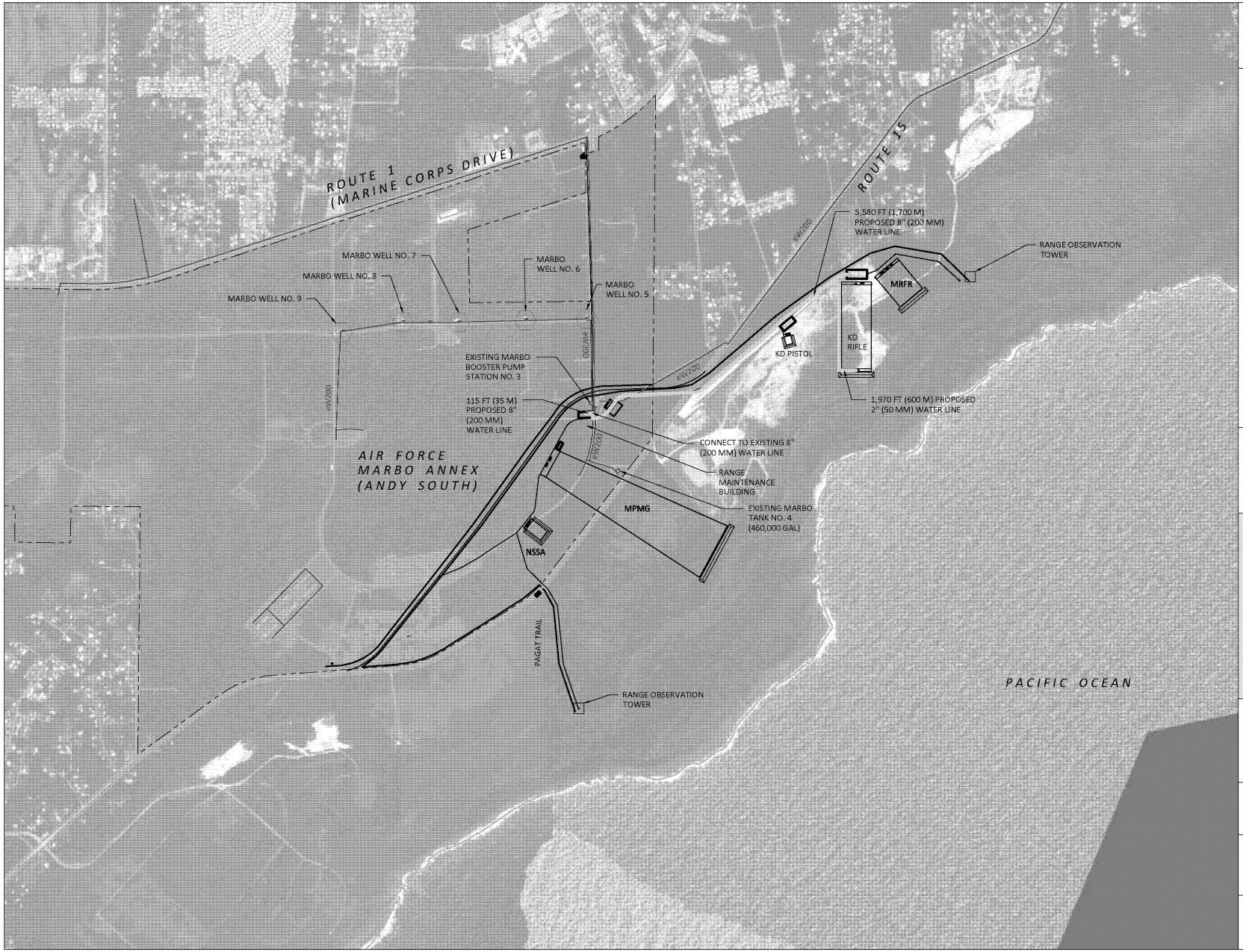


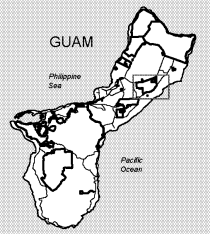
Figure 3.3-5
Route 15A Alternative Water Plan

PROPOSED 8" (200 MM) WATER LINE
EXISTING DOD WATER LINE
EXISTING DOD WELL
DOD PROPERTY LINE

Potable water service is required for the Range Maintenance Building, KD Pistol Range and KD Rifle Range only.

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 500 1000 m

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: June 2013

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

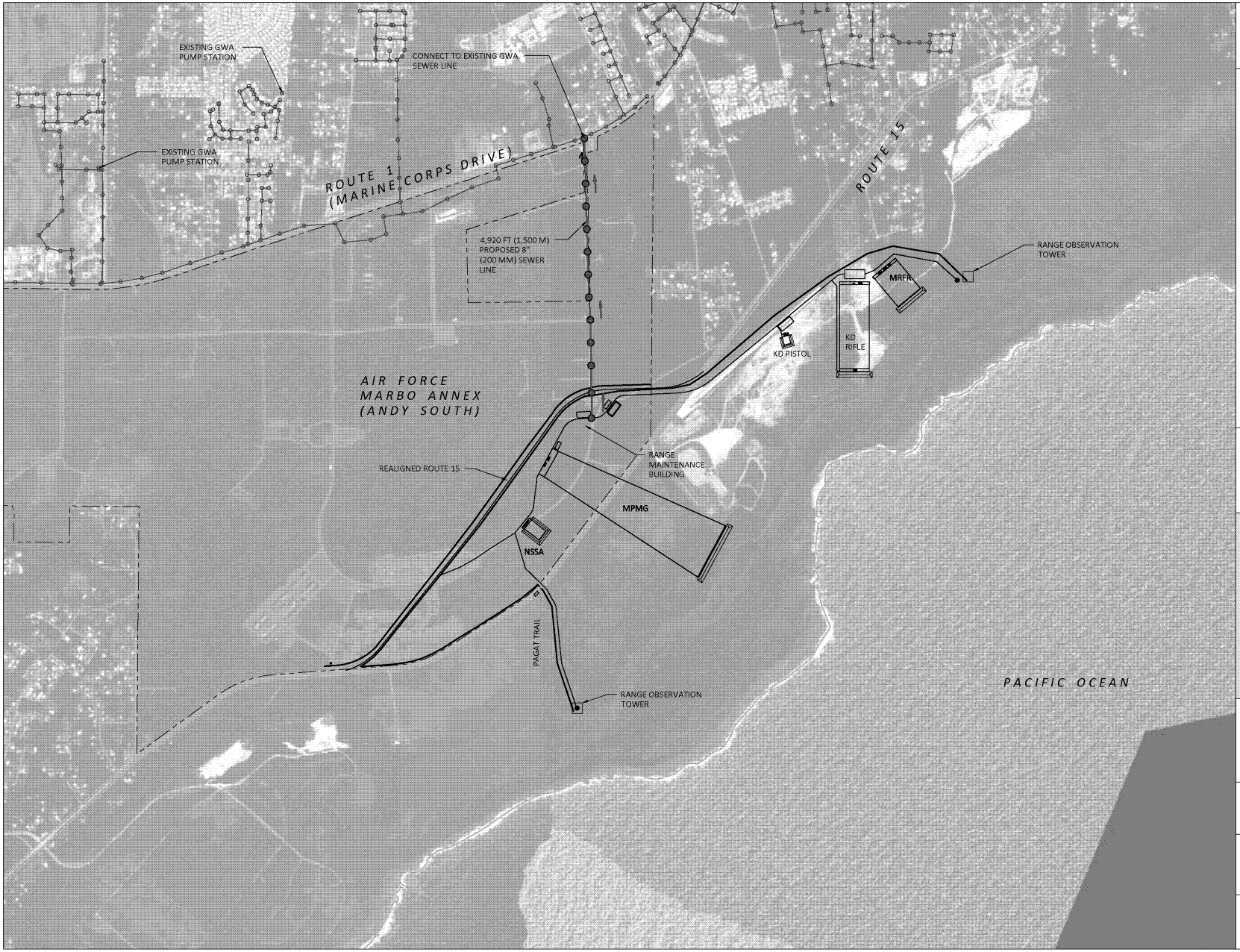


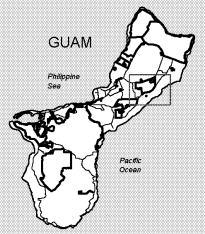
Figure 3.3-6
Route 15A Alternative Wastewater Plan

- PROPOSED 8" (200 MM) SEWER LINE
- PROPOSED SEWER MANHOLE
- EXISTING GWA SEWER
- EXISTING GWA MANHOLE
- DOD PROPERTY LINE

Sewer collection is required for the Range Maintenance Building only.

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 500 1000 m

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: June 2013

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

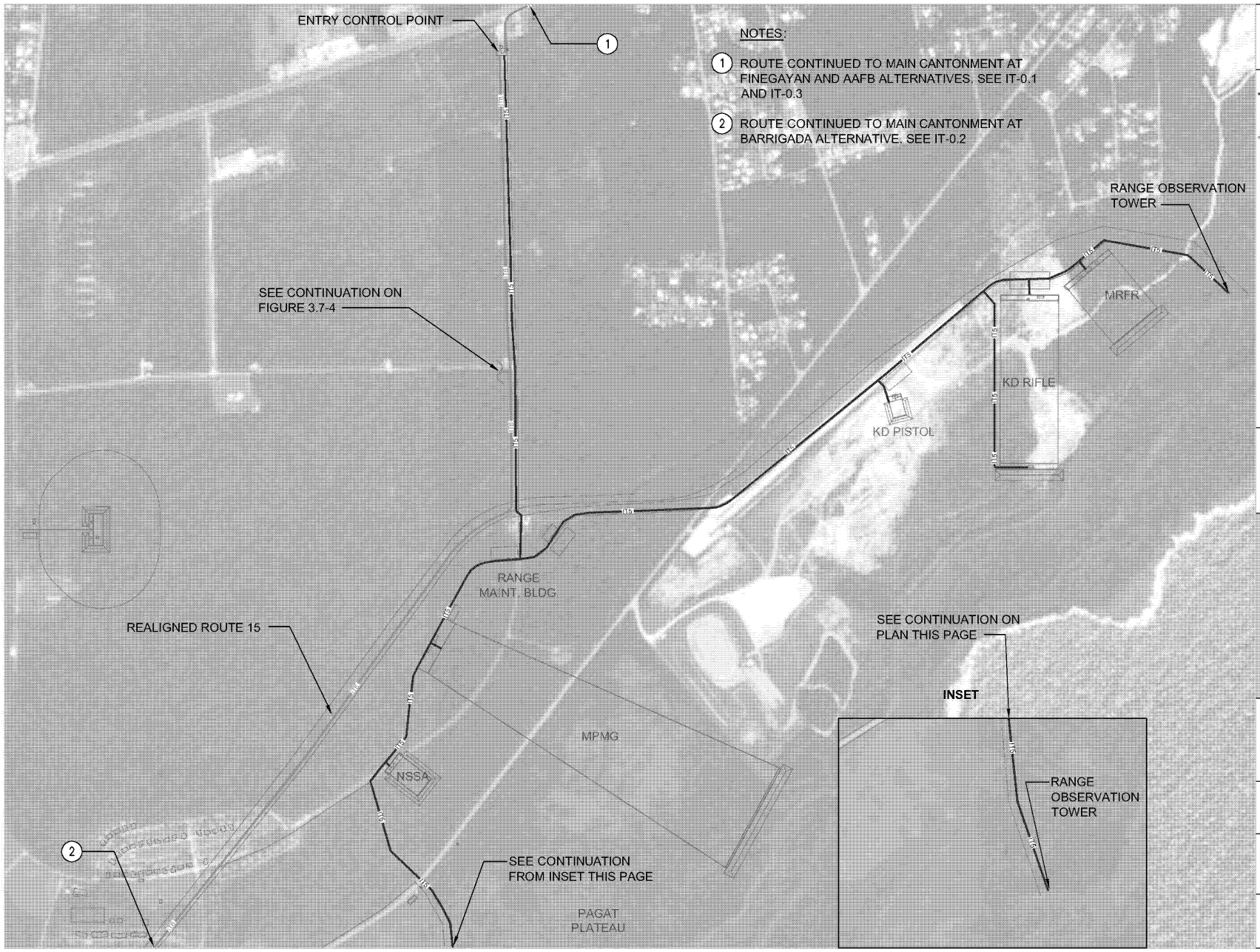


Figure 3.3-7
Route 15A Alternative
IT/COMM Plan

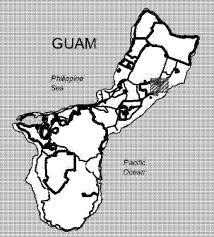
IT5 — DISTRIBUTION TO LFTRC - DB1

IT6 — USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

DB# DUCT BANK TYPE - SEE DUCT BANK AND CABLE SCHEDULE ON APPENDIX D FOR REQUIREMENTS

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 200 m 400 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

The RT 15A alternative would displace the Guam International Raceway and a quarry operation adjacent to the raceway. Both of these activities are operating under a lease between the Chamorro Land Trust Commission and the Guam Raceway Federation that ends on June 1, 2018.

Approximately 80 ac (32 ha) of the Pagat Point archaeological site would be encumbered by the LFTRC composite SDZ.

An Operational Noise Assessment of the RT 15A alternative, conducted by the USAPHC, concluded the following:

- The ranges in the northern area of the RT 15A land expansion area generate Noise Zones (Figure 3.3-8), which would extend beyond the boundary encompassing residential areas and undeveloped land. Noise-sensitive land uses are discouraged within areas that would experience 65–69 dB Average Day-Night Sound Levels (ADNL), and residential uses are strongly discouraged between 70–74 dB ADNL. Based on available imagery, there would be no noise-sensitive land uses within the off-base Zone 3. Zone 2 (65–69 dB ADNL) would encompass approximately eight residential properties. Zone 2 (70-74 dB ADNL) would encompass two residential properties. Although Zone 1 would encompass multiple residential properties, noise-sensitive land uses would be considered compatible within Zone 1.
- The ranges in the southern portion of the Route 15A land expansion area would generate Zones 1 and 2, which extend beyond the southern boundary of Andersen South. The Route 15A land expansion area would encompass undeveloped land. Levels above 75 dB ADNL (Zone 3) would not extend beyond the boundary.
- The Noise Zones would not encompass any noise-sensitive land uses within Andersen South.

3.3.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.3-9 and Figure 3.3-10). The significance of the impacts and potential mitigation listed in this report will be addressed in the SEIS. The construction and operation of the facility would increase the impacts of invasive species throughout the area, as well as affect the surrounding vegetation communities.

The RT 15A alternative would affect the following terrestrial biological resources:

- Clearing of primary and secondary limestone forest, which is considered suitable habitat for the ESA-listed Mariana fruit bat.
- Removal of a large number of the Guam-listed tree *Heritiera longipetiolata*.
- Possible mortality of the candidate ESA Mariana eight-spot butterfly, which has been documented in the LFTRC developed area.
- Clearing of suitable habitat potentially used by the ESA-listed Mariana fruit bat, and disturbance of suitable habitat that could be used by the fruit bat in additional areas around the LFTRC.
- Invasive species impacts on all special-status species.

Biological impacts would include the following:

- Invasive species impacts on all special-status species.

For cultural resources, construction of the RT 15A alternative would potentially result in impacts on three historic properties (archaeological sites). In addition, 23 buildings that have not been evaluated for NRHP-eligibility would require demolition. As many as four historic properties could be impacted during operations.

3.3.6 Public Access

The siting of the RT 15A alternative would allow unimpeded (24 hours per day/7 days a week) access to the Pagat Trail and the Pagat Village archaeological site. Public access to the Pagat Point archaeological site and nearshore waters encumbered by the SDZ would be prohibited when the LFTRC ranges are active.

3.3.7 Range Transients

Proposed fencing and the ECP would prevent unauthorized persons from entering the LFTRC and the SDZ encumbering the plateau above Pagat Point. Signage at Pagat Village would warn individuals of the dangers of entering Pagat Point without coordination and permission from Range Control.

Watercraft may inadvertently enter portions of the nearshore SDZ. The two proposed Range Observation Towers would allow surveillance of the nearshore SDZ, and live-fire training would cease if the SDZ were penetrated by watercraft. The visual coverage of the Range Observation Towers is shown in Figure 3.3-11. Live-fire training may resume once the watercraft clears the SDZ.

If approved by the FAA, the proposed Andersen South R-7202 (Plateau) RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live-fire training would cease until the aircraft is clear of the SDZ.

3.3.8 Operational Efficiency

The proposed RT 15A alternative locates all facilities in a single complex. The location adjacent to the Andersen South Training Complex would facilitate transitions from live-fire to non-live-fire training and provide maximum efficiency for range maintenance and management.

3.3.9 Orientation

The generally southeastern orientation of the ranges would cause a loss of daylight training in the early morning hours. The low sun rising in the east would affect the training audience's ability to engage targets on the southeast-facing ranges and would limit early morning use of magnifying optics to avoid damage to eyesight.

3.3.10 Life Cycle Cost

The life cycle cost for the RT 15A alternative is $609,246,000. See Table 2.6-1 for cost breakdown.

3.3.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the RT 15A alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges January 2020
- MPMG Range March 2020

1 THIS PAGE INTENTIONALLY LEFT BLANK

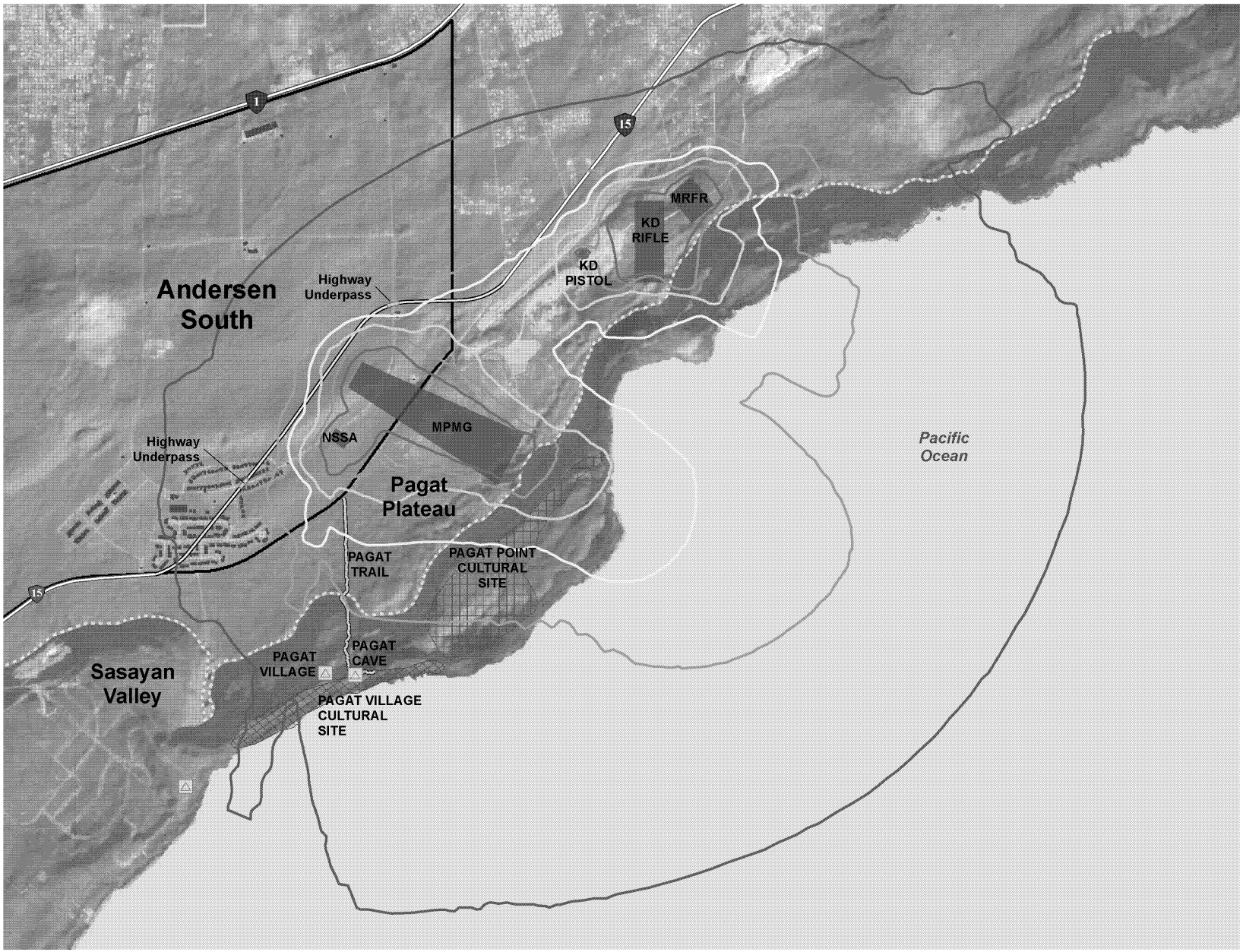


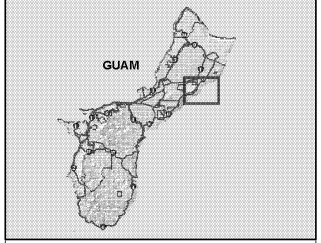
Figure 3.3-8
RT 15A Alternative
Operational Noise Assessment

Small Caliber ADNL Noise Zone

- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Cultural Landmark
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Live-Fire Range Area
- Cliffline
- Existing Structure
- DoD Property Line
- Pagat Point Cultural Site
- Pagat Village Cultural Site

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet

0 250 500 Meters

PREPARED BY: Date: 6/21/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Date: 6/21/2013 Path: P:\PDI\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\06212013_Edits\3.3-11 RT 15A Small Caliber ADNL Noise_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

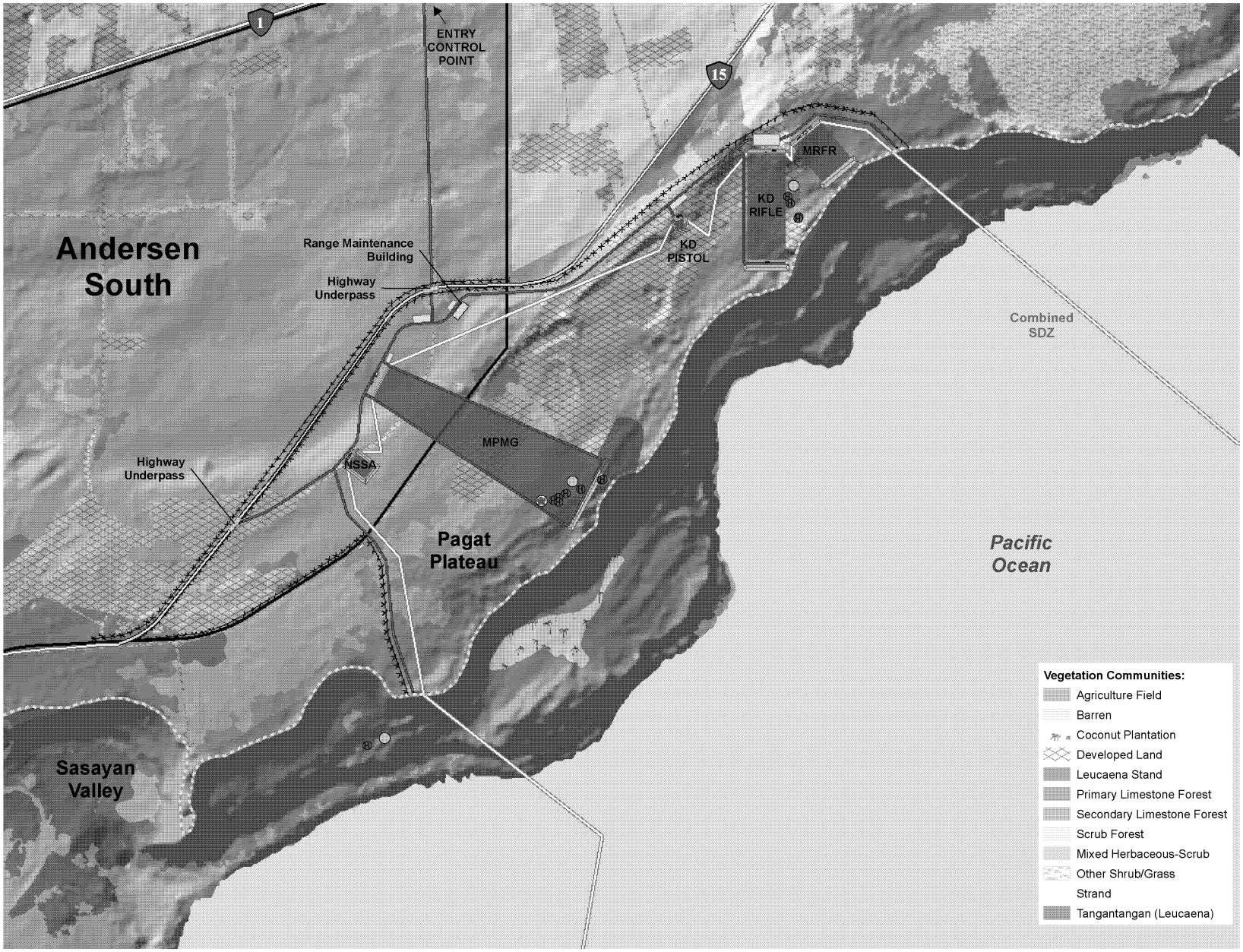


Figure 3.3-9
RT 15A Alternative Vegetation and Special-Status Species

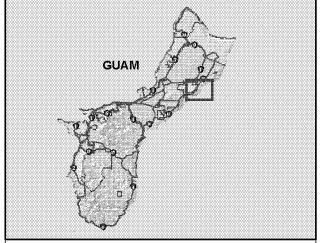
Special-Status Species Occurrence

Fauna
- Mariana Eight-Spot Butterfly

Flora
- Mariana Eight-Spot Butterfly Host Plant
- *Heritiera longipetiolata*
- Mariana Eight-Spot Butterfly Host Plant Area
- *Heritiera longipetiolata* Clusters
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Fence Line
- Range Structure
- Range Road
- Parking Area
- Cliffline
- RT 15A Combined SDZ
- Live-Fire Range Area

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet

0 300 600 Meters

PREPARED BY: Date: 6/25/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Date: 6/25/2013 Path: P:\PDI\60224517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.3-9 RT 15A Vegetation and SSS_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

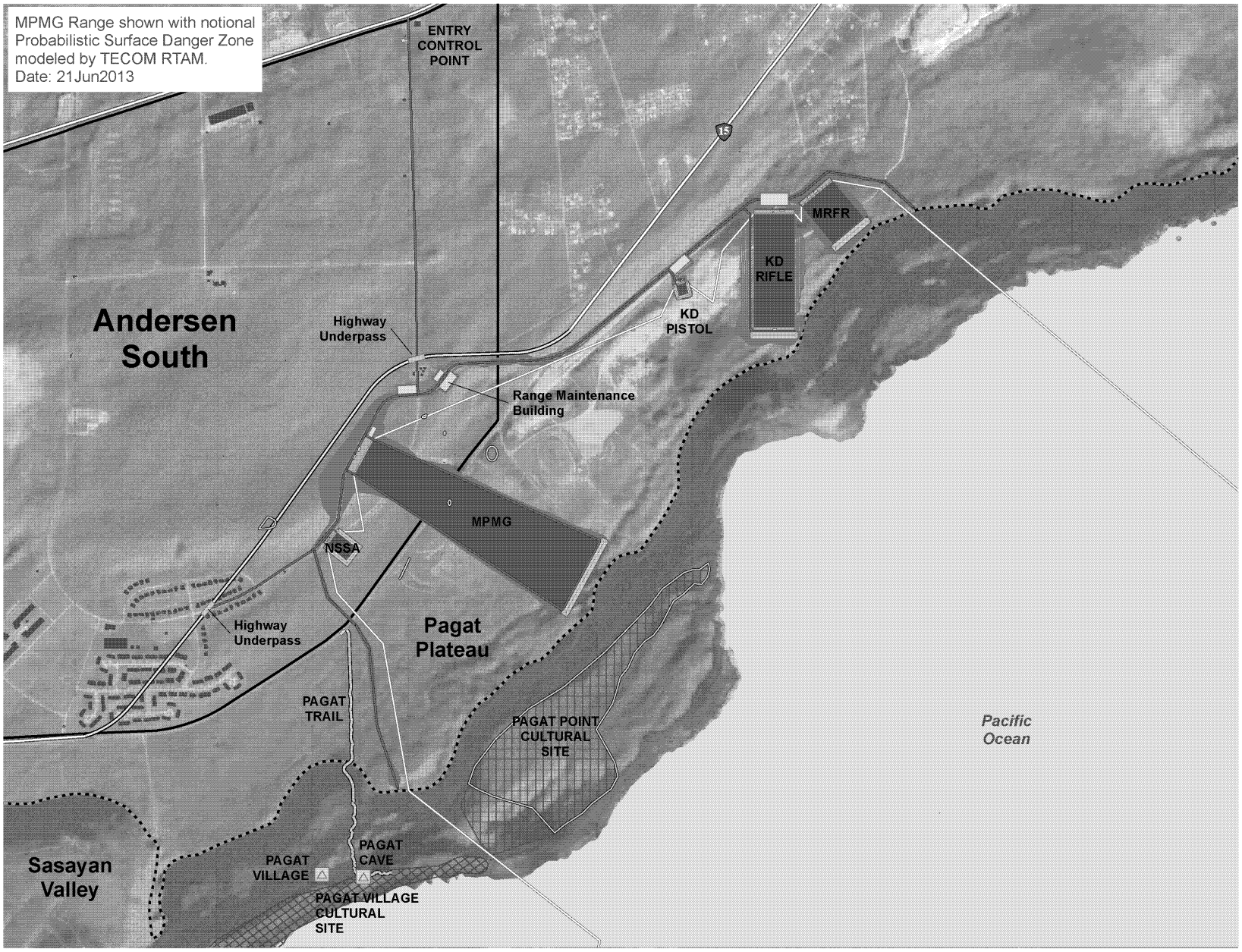
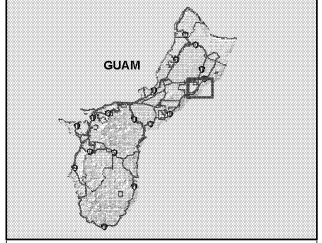


Figure 3.3-10
RT 15A Alternative
Cultural Resources

- Cultural Resource Area
- Cultural Landmark
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Parking Area
- Proposed Range Road
- Berm Area
- Range Support Area
- RT 15A Combined SDZ
- Live-Fire Range Area
- Proposed Grading Contour (5 ft int)
- Cliffline
- Existing Structure
- DoD Property Line
- Pagat Point Cultural Site
- Pagat Village Cultural Site

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,000 2,000 Feet
0 250 500 Meters

PREPARED BY: Date: 6/21/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Date: 6/21/2013 Path: P:\PDN60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layouts\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.3-10 RT 15A Cultural Resources.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

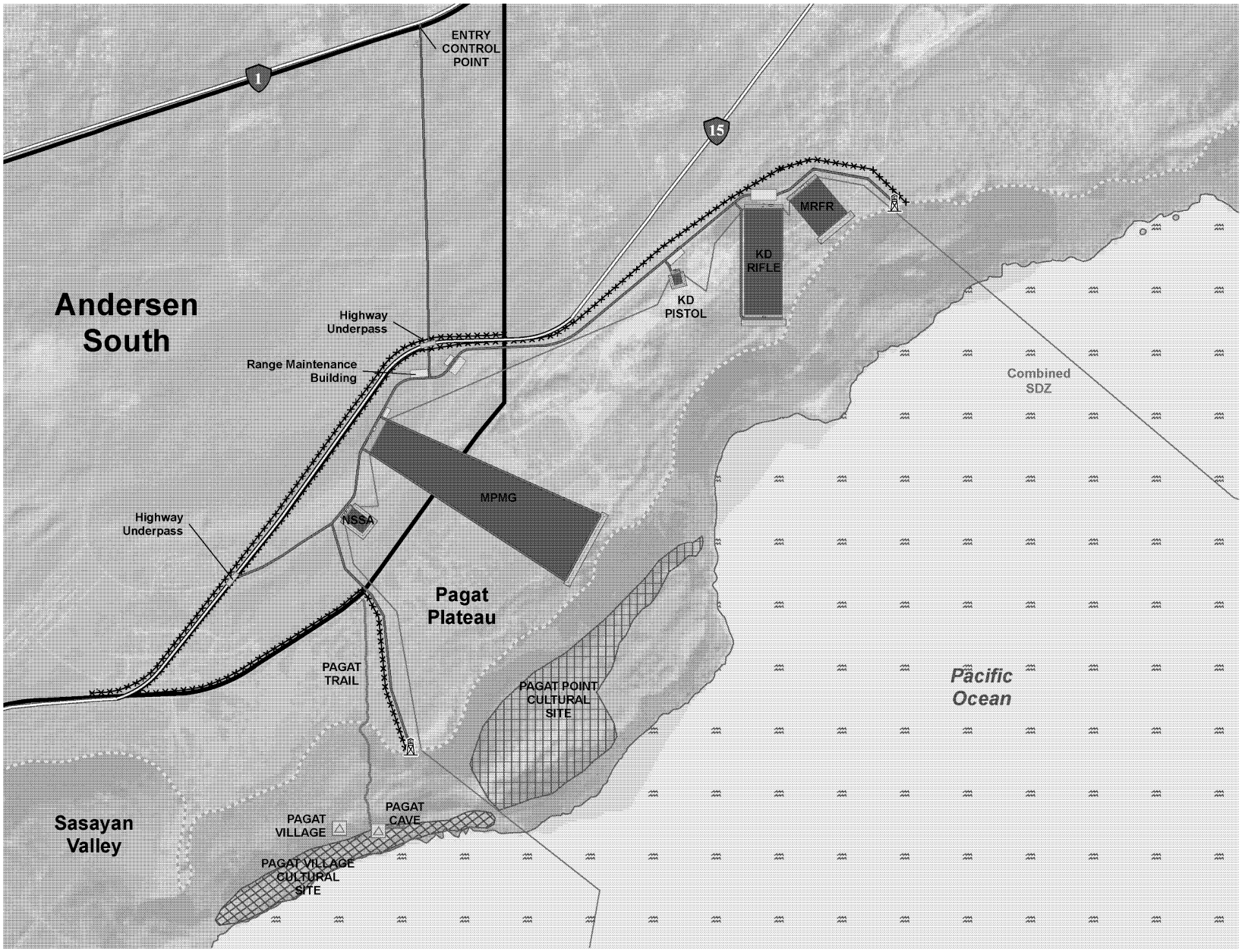


Figure 3.3-11
RT 15A Alternative
Observation Tower Coverage

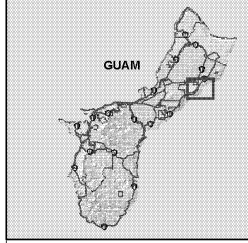
- Cultural Landmark
- Open Water (Ocean)
- Underpass
- Realigned Route 15
- Highway (shows realignment)
- Range Tower
- Fence Line
- Range Structure
- Range Road
- Parking Area
- Cliffline
- RT 15A Combined SDZ
- Live-Fire Range Area
- Pagat Point Cultural Site
- Pagat Village Cultural Site

Value

- Not Visible to 10m Range Tower
- Visible to 10m Range Tower

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,200 2,400 Feet
0 300 600 Meters

PREPARED BY: Date: 6/25/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Date: 6/25/2013 Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.3-11 RT 15A Alt OTC_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

3.4 NMS NORTH/SOUTH ALTERNATIVE

The NMS North/South alternative would be located on the NMS in southern Guam (Figure 3.4-1 and Figure 3.4-2). The construction of ranges and supporting facilities would cause the relocation of some existing NMS munitions storage magazines to newly constructed magazines on unaffected areas of the NMS. The composite SDZ would extend over non-DoD land to the east of the NMS.

3.4.1 Existing Conditions and Constraints

The NMS covers 8,645 ac (3,499 ha) and consists of the munitions storage area and the Fena Valley Reservoir and watershed area (Figure 3.4-2). NMS is approximately 6 mi (10 km) southeast of Naval Base Guam. The property contains the Naval Munitions Command Detachment Guam Headquarters. The explosive storage and associated administrative facilities are located in the northern portion of the site. Seventy-five percent of the NMS parcel is within the designated explosive safety arcs due to the storage and transport of munitions. NMS and the surrounding area consist of hilly, heavily vegetated and sparsely developed areas. The highest point on Guam (Mount [Mt.] Lamlam) is just within the NMS boundary along its southwest border.

The Fena Valley Reservoir provides an important source of drinking water for Guam. The reservoir is entirely within DoD property and closed to the public. A summary of existing conditions is shown in Figure 3.4-3.

Source: AECOM 2010.

Figure 3.4-1: NMS Aerial Photo

3.4.2 Land/Sea/Air Space Availability

The NMS North/South alternative would require the acquisition of approximately 252 ac (102 ha) of non-DoD land to the east of the NMS for the SDZ. Construction of the LFTRC on the NMS would require the relocation of 72 munitions storage magazines with a Net Explosive Weight (NEW) capacity of 17,607,519 pounds (lbs)

(7,986,636 kilogram [kg]) and 116,000 ft² (10,777 m²) to create the necessary land area for the range complex and associated SDZ. Infill at the NMS east of Fena Valley Reservoir would support a total NEW capacity of 32,384,600 lbs (14,689,407 kg) and 130, 000 ft² (12,077 m²) (AECOM 2013).

Grading for the NMS North/South alternative is shown in Appendix B and summarized in Table 3.4-1.

Table 3.4-1: Grading Volumes for the NMS North/South Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	1,873,170	1,955,000	81,830	Fill	93
KD Rifle Range	1,446,800	14,000	1,432,800	Cut	36
MRF Range	402,820	396,000	6,820	Cut	24
NSSA Range	29,300	27,300	2,000	Cut	5
KD Pistol Range	19,440	800	18,640	Cut	2
Totals	**3,771,530**	**2,393,100**	**1,378,430**	**Cut**	**160**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend 2,965 ft (904 m) AGL. MARFORPAC has proposed the Naval Munitions R-7202 RA to deconflict range operations with air traffic. The proposed Naval Munitions R-7202 RA would overlay the Guam International Airport Runway 24/06 approach/departure corridors. Mitigation of these impacts is subject to ongoing actions between the Marines and FAA.

3.4.3 Supporting Infrastructure

Access to the NMS North/South alternative would be from the existing NMS Main Gate on Route 5. Existing NMS roadways would be used wherever possible, but a total of 3 mi (5 km) of new roadway would be required to support LFTRC operations.

Power to the MPMG Range would be from existing Navy-owned 13.8 kV overhead line along Blandy Road, near Building 835. This tap circuit would run underground and share a common trench with the new IT/Comm line to the MPMG Range. A 10 kVA, pad-mounted transformer near the range would transform the 13.8 kV line to 120/240 V.

Power to the remaining range sites could be from an existing three-phase, 13.8 kV overhead line, running along Parsons Road, near Building 465NM. This 13.8 kV, single-line tap would run underground and share a common trench with the IT/Comm line. A 10 kVA, pad-mounted transformer would be located near each tower building to transform the 13.8 kV line to 120/240 V.

The utilities plans for the NMS North/South alternative are depicted in Figure 3.4-4 through Figure 3.4-7.

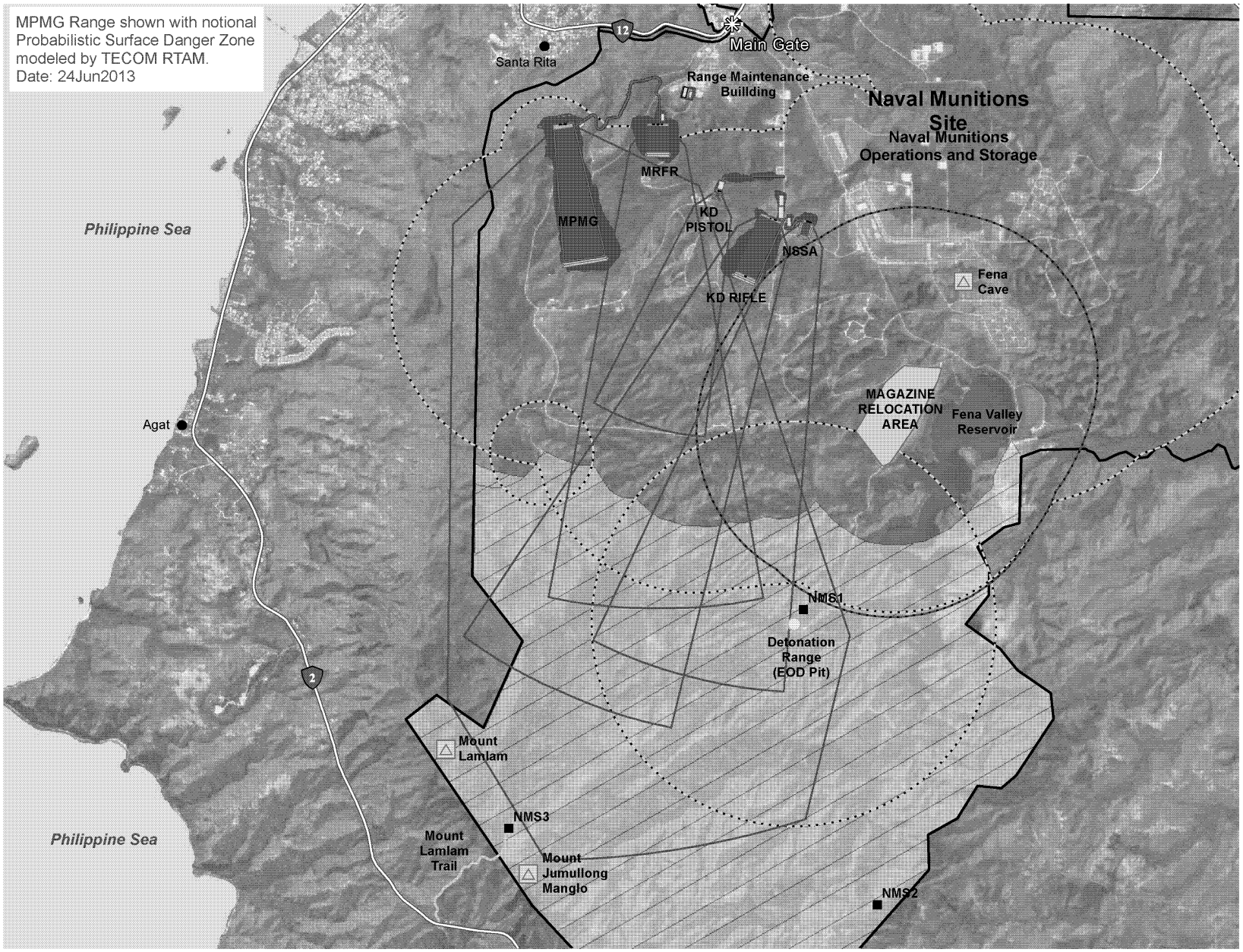


Figure 3.4-2
NMS North/South Alternative

- Cultural Landmark
- Detonation Range Area
- Landing Zone and ID
- Range Structure
- Parking Area
- Range Road
- Berm Area
- Range Support Area
- Surface Danger Zone (SDZ)
- Live-Fire Range Area
- Proposed Magazine ESQD Arc
- Munitions Magazine Relocation Area
- Proposed Grading Contour (5 ft int)
- Hiking Trail (Mt. Lamlam)
- NMS ESDQ Arc
- DoD Property
- Approved Non-Live-Fire Maneuver Training Area
- Wetlands (NMS and Private Lands)

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet
0 500 1,000 Meters

PREPARED BY: Date: 6/24/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command Pacific

Date: 6/24/2013 Path: P:\PDI\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.4-2 NMS NS Alternative_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

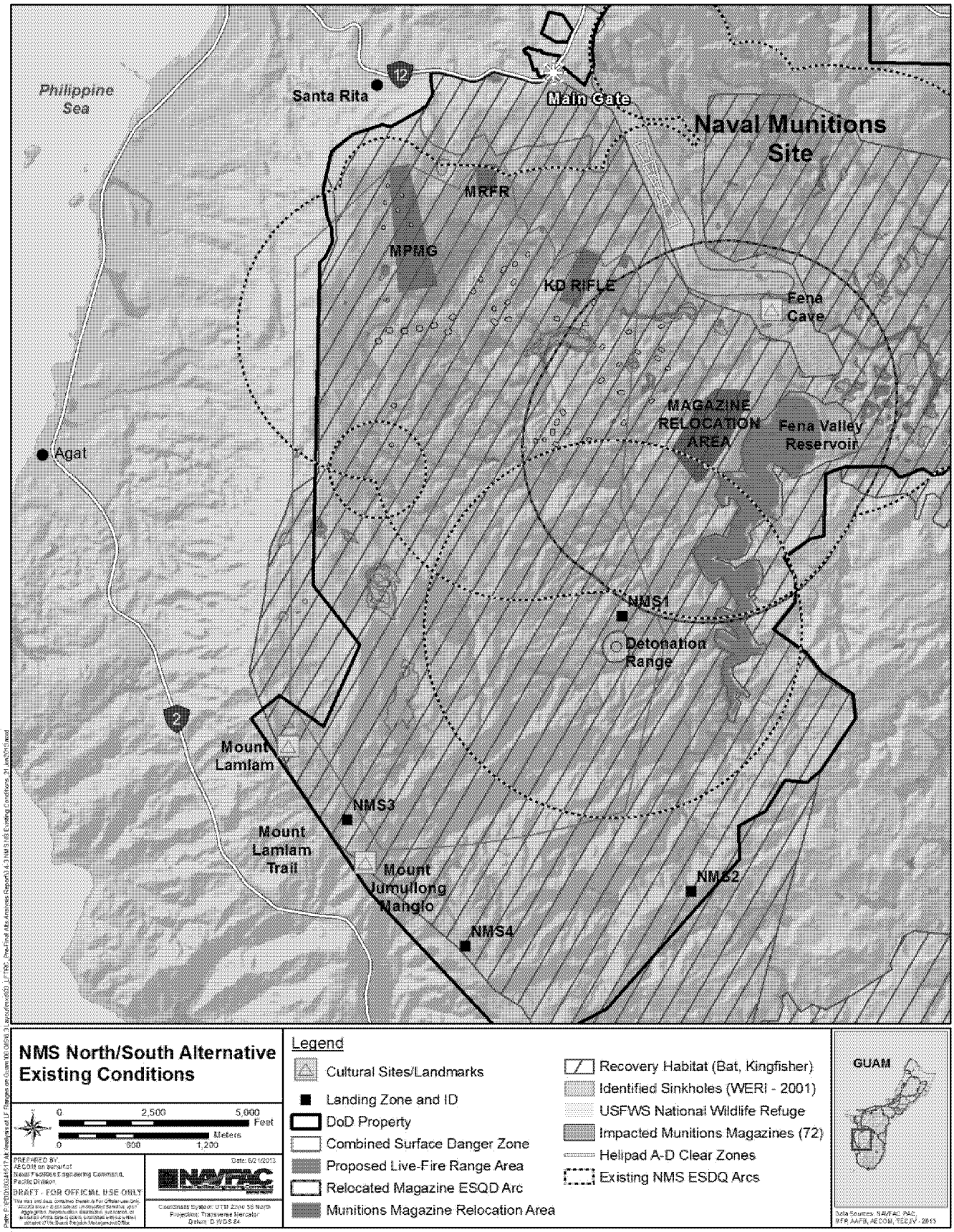


Figure 3.4-3: NMS North/South Alternative Existing Conditions

THIS PAGE INTENTIONALLY LEFT BLANK

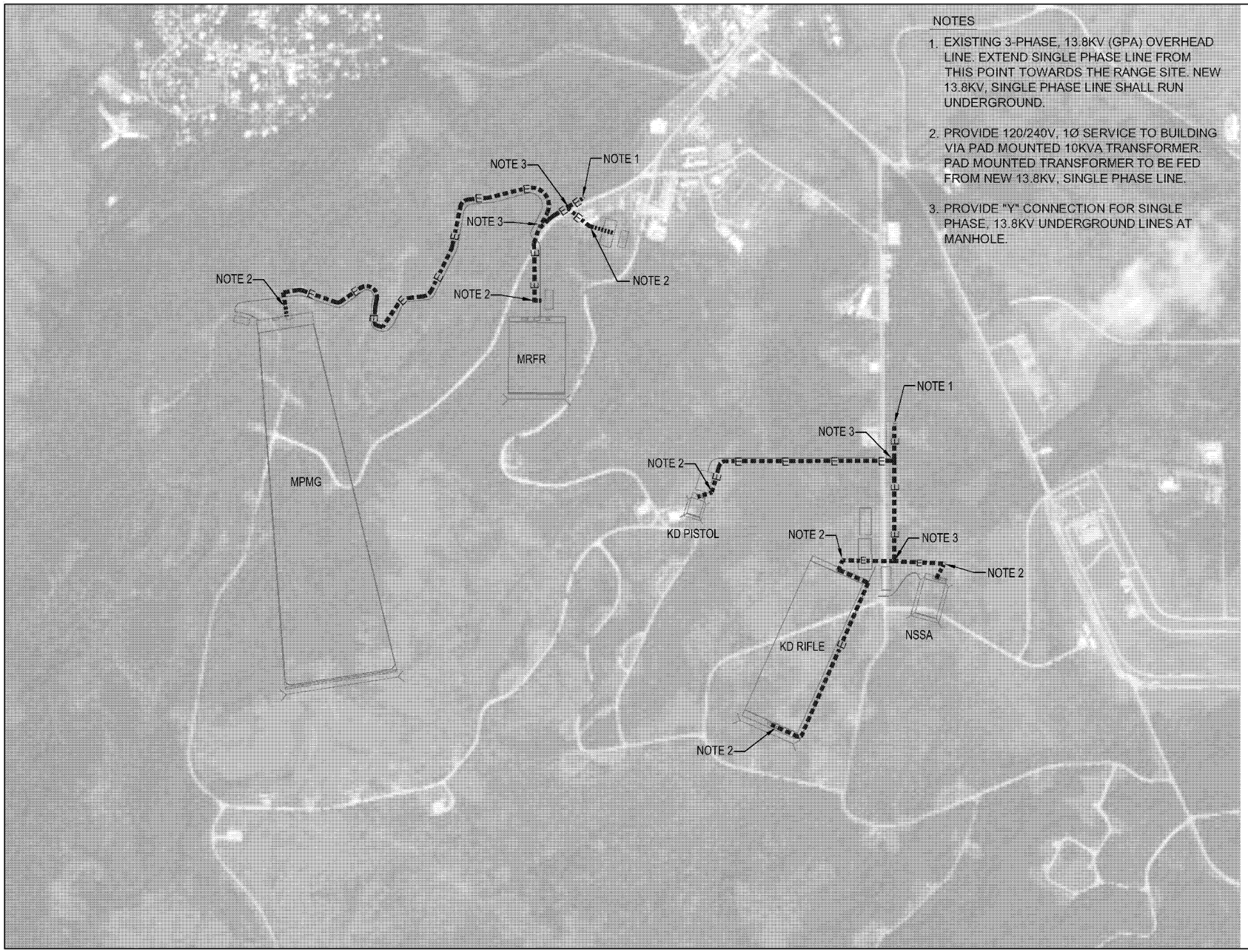


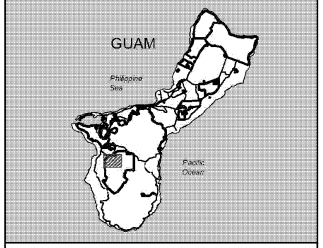
Figure 3.4-4
NMS North/South Alternative Electrical Plan

Legend

- E NEW 13.8KV, 1Ø UNDERGROUND LINE
- NEW 120/240V, 1Ø UNDERGROUND LINE FROM TRANSFORMER TO BUILDING

*All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 200 m 400 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

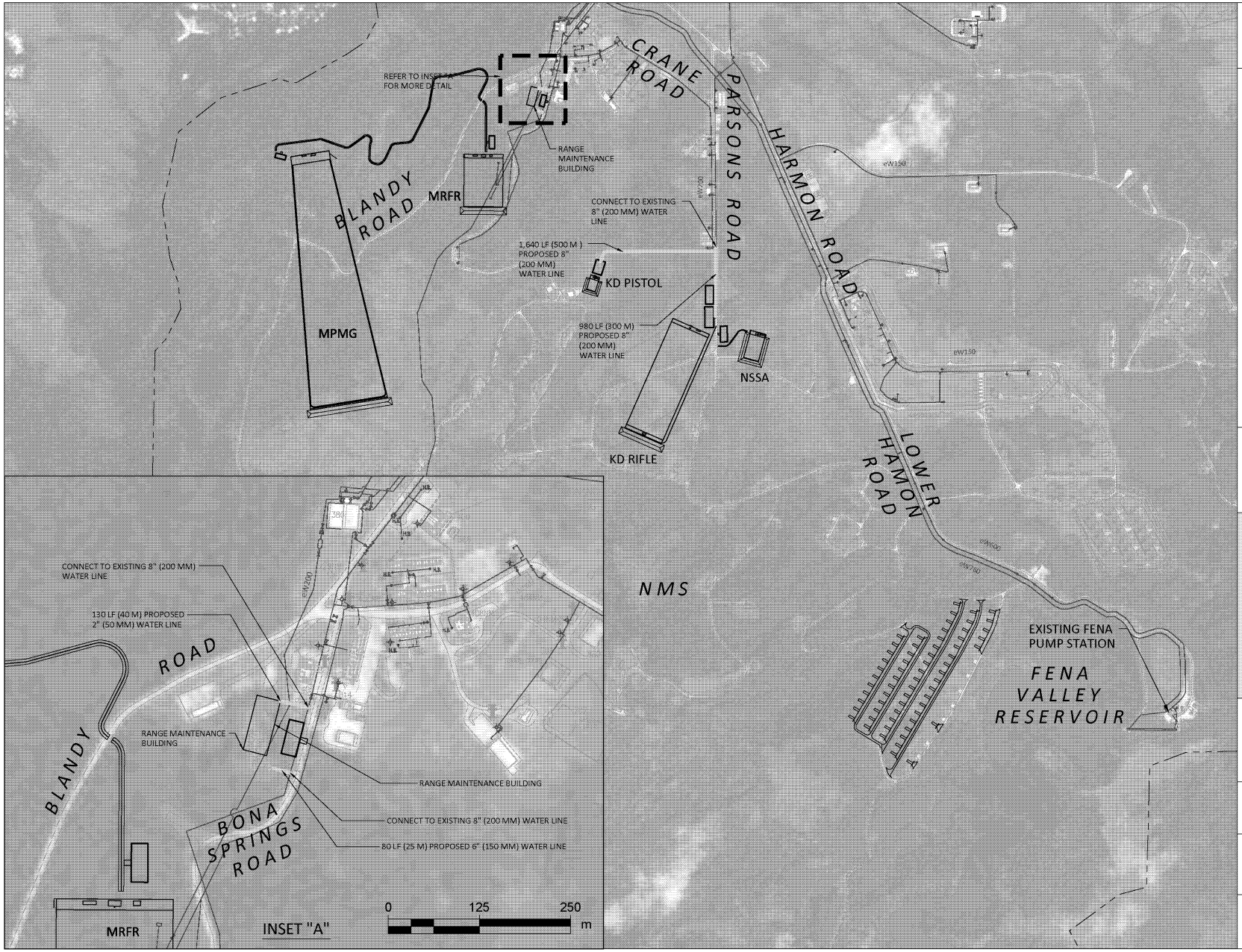


Figure 3.4-5
NMS North/South Alternative Water Plan

PROPOSED 8" (200 MM) WATER LINE

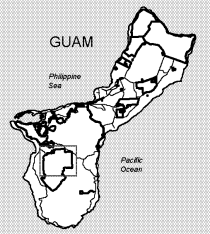
EXISTING DOD WATER LINE

DOD PROPERTY LINE

PROPOSED FIRE HYDRANT

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 375 750 m

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: June 2013

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

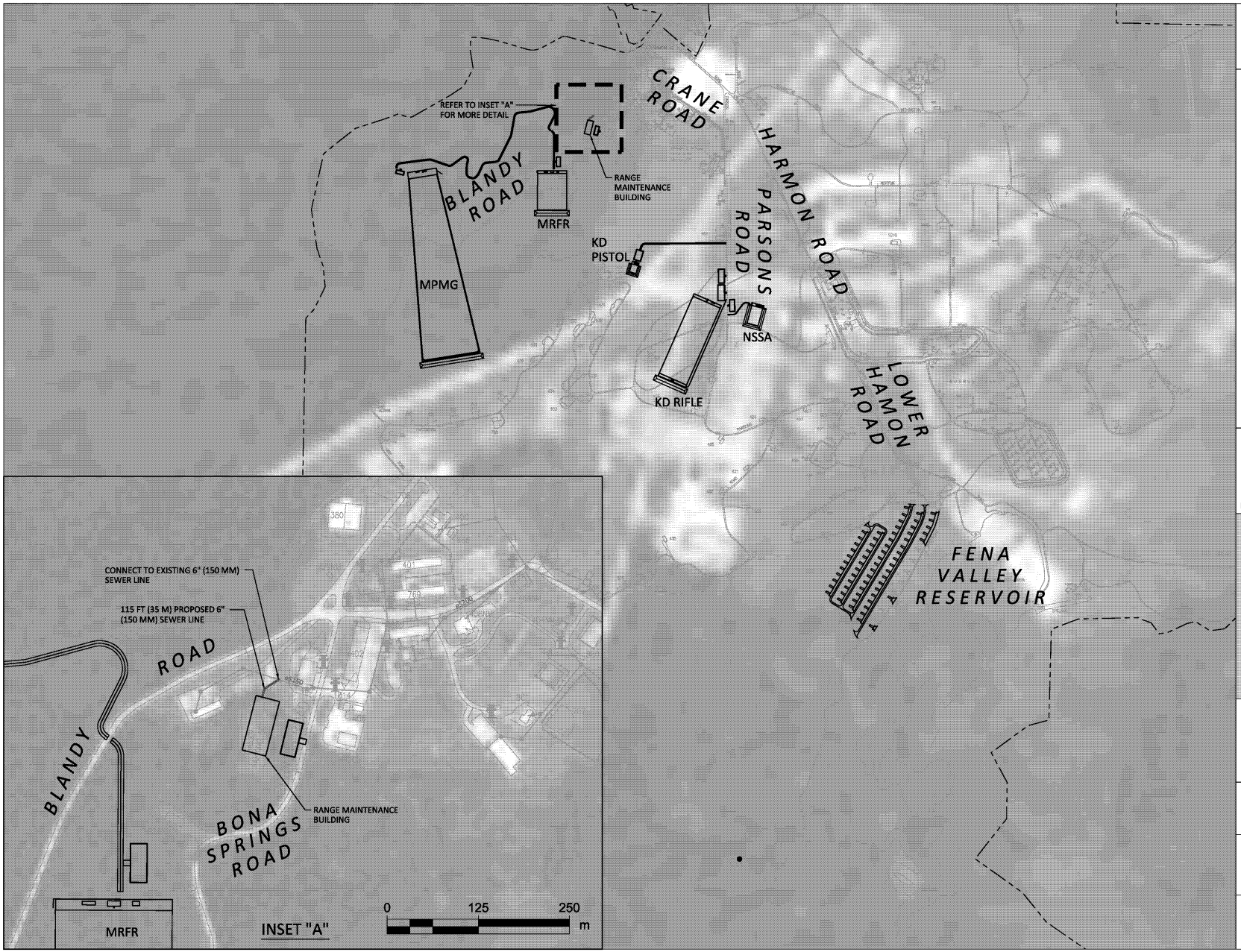


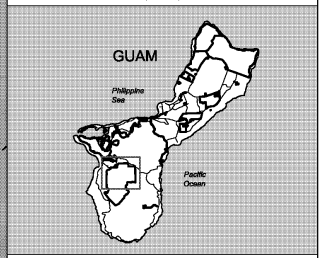
Figure 3.4-6
NMS North/South Alternative Wastewater Plan

PROPOSED 8" (200 MM) SEWER LINE
EXISTING DOD SEWER LINE
EXISTING DOD MANHOLE
DOD PROPERTY LINE

Sewer collection is required for the Range Maintenance Building only.

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 500 1000 m

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: June 2013

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command Marianas

THIS PAGE INTENTIONALLY LEFT BLANK

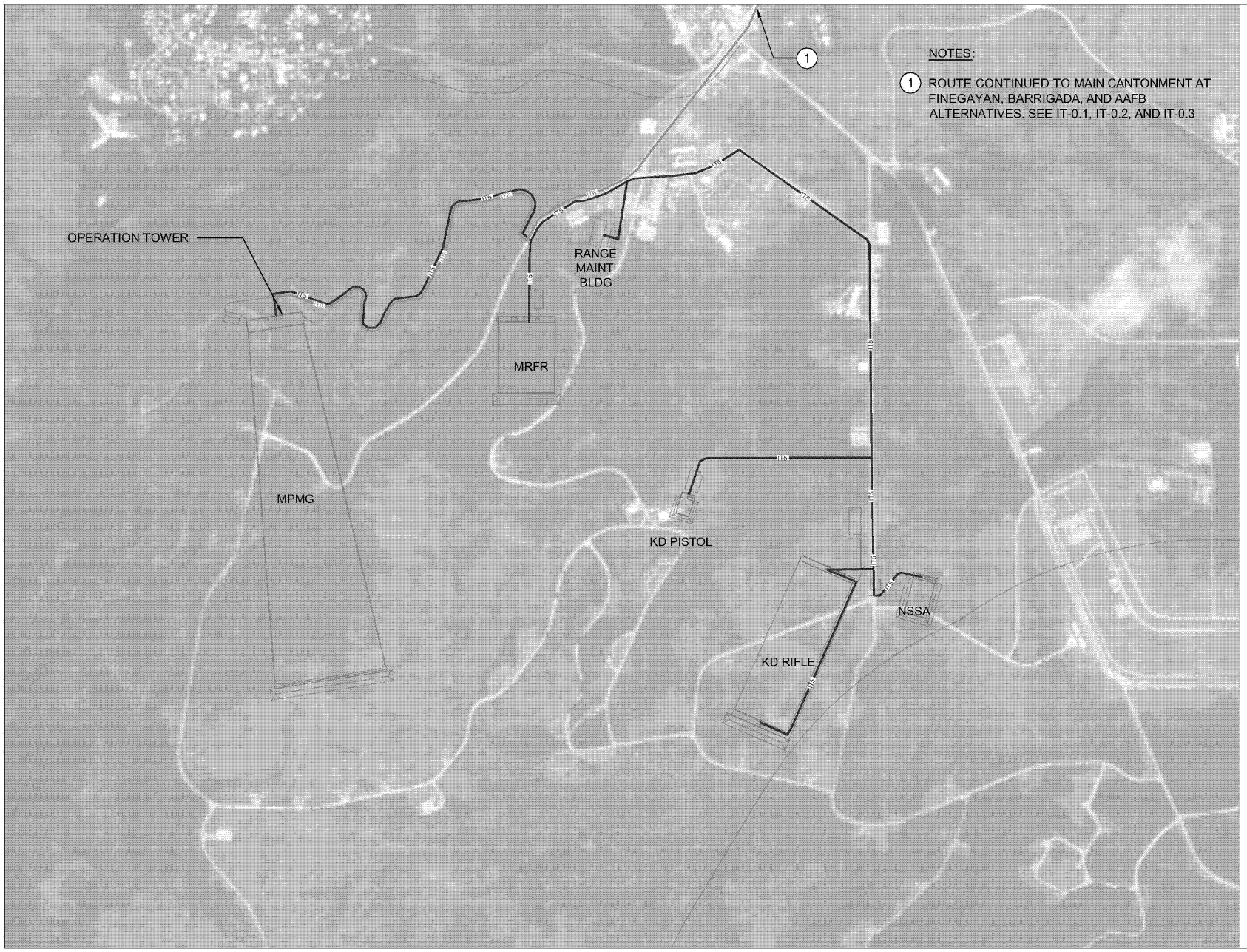


Figure 3.4-7
NMS North/South Alternative IT/COMM Plan

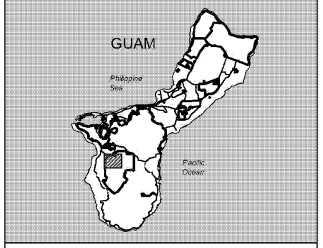
IT5 — DISTRIBUTION TO LFTRC - DB1

IT5 — USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

DB# DUCT BANK TYPE - SEE DUCT BANK AND CABLE SCHEDULE ON APPENDIX D FOR REQUIREMENTS

*All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 200 m 400 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

3.4.4 Land Use Compatibility

The NMS North/South alternative would displace 72 existing munitions storage magazines and would also encumber the planned location of 10 magazines with a NEW capacity of 5,000,000 lbs (2,267,962 kg) and 20,000 ft² (1,860 m^2) identified in the 2010 Guam Relocation FEIS (JGPO 2010). These planned magazines were planned to support 8,600 Marines. The requirement must be revalidated due to the reduction in force size and change in force structure. In addition to the lost munitions storage, the composite LFTRC SDZ would encumber the existing breacher house, sniper range, and the Ordnance Annex Detonation Range. The Detonation Range is used approximately 82 days each year to neutralize mines or unexploded ordnance (UXO) (JGPO 2010). The Detonation Range also supports the round-the-clock emergency destruction of UXO. This emergency destruction mission would take precedence over MPMG training and would cause a cessation of training on the MPMG Range during emergency destructions. In addition to existing uses, the LFTRC SDZ would also encumber the NMS 1 Landing Zone and 1,630 ac (660 ha) of the Non-Firing Maneuver area identified in the Guam Relocation FEIS (JGPO 2010). Use of these facilities/areas would be prohibited when the LFTRC is supporting live-fire training. While the LFTRC SDZ does not directly encumber the NMS 3 Landing Zone, its proximity would present operational flight limitations should the surface winds dictate a flight path into or near the SDZ for takeoff and landing maneuvers.

An Operational Noise Assessment of the NMS North/South alternative (Figure 3.4-8), conducted by the USAPHC, concluded that Noise Zones 2 and 3 for the NMS North/South alternative would be generally contained within the NMS, with only approximately 30 ac (12 ha) extending beyond the boundary into undeveloped areas. Although there would be residences exposed to Zone 1 levels from MPMG Range activity off-base, noise levels would be compatible with existing land uses. Within NMS, the Noise Zones would not encompass any noise-sensitive land uses.

3.4.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.4-9 and Figure 3.4-10). The significance of the impacts and potential mitigation listed in this report would be addressed in the SEIS. All construction and operation activities have the potential to increase the biological impacts associated with the spread of invasive species, with resulting threats to special-status species.

The NMS North/South alternative would affect the following terrestrial biological resources:

- Clearing of primary limestone forest, ravine forest, and forested wetland, which serve as potential habitat for special-status species. A large area of limestone forest at the MPMG Range that is relatively undisturbed and not substantially impacted by ungulates would be removed. Some patches of the Guam SOGCN tree *Merrilliodendron megacarpum* would also be removed.
- Removal of large areas of the Overlay Refuge, which would reduce natural resource conservation benefits.
- Mortality of the Guam-listed Pacific slender-toed gecko at the MPMG Range.
- Clearing of suitable habitat used by the ESA-listed Mariana fruit bat and ESA-listed Mariana swiftlet.

- Loss of one pond used by the Mariana common moorhen.
- Removal of host plants for the ESA-candidate species Mariana eight-spot butterfly would occur, although the butterfly itself has not been observed in the area.

Biological impacts would include the following:

- Impacts on the Mariana common moorhen at one pond that would be cleared and one pond just outside in an area that would be impacted by activity and noise from range operations.
- Impacts on the Mariana fruit bat from activity and noise.
- Invasive species impacts on all special-status species.

For cultural resources, construction of the NMS North/South alternative would potentially result in direct impacts on 15 NRHP-eligible archaeological sites. Indirect impacts on as many as 215 archaeological sites and two structures could occur during operations.

3.4.6 Public Access

Public access to the NMS is currently restricted. The proposed LFTRC would not cause any additional loss of public access. There would be no impacts on the Mt. Lamlam Trail under this alternative.

3.4.7 Range Transients

The existing fencing and ECP would prevent unauthorized persons from entering the LFTRC and the SDZ through the NMS. The extremely steep and heavily vegetated terrain on the eastern, southern, and western boundaries of the NMS would reduce the likelihood of unauthorized access by personnel.

If approved by the FAA, the proposed Naval Munitions R-7202 RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live-fire training would cease until the aircraft is clear of the SDZ.

3.4.8 Operational Efficiency

The proposed NMS North/South alternative would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.

3.4.9 Orientation

The generally southern orientation of the ranges would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun.

3.4.10 Life Cycle Costing

The life cycle cost for the NMS North/South alternative is $696,035,000. See Table 2.6-1 for cost breakdown.

3.4.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the NMS North/South alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges July 2019
- MPMG Range July 2019

1 THIS PAGE INTENTIONALLY LEFT BLANK

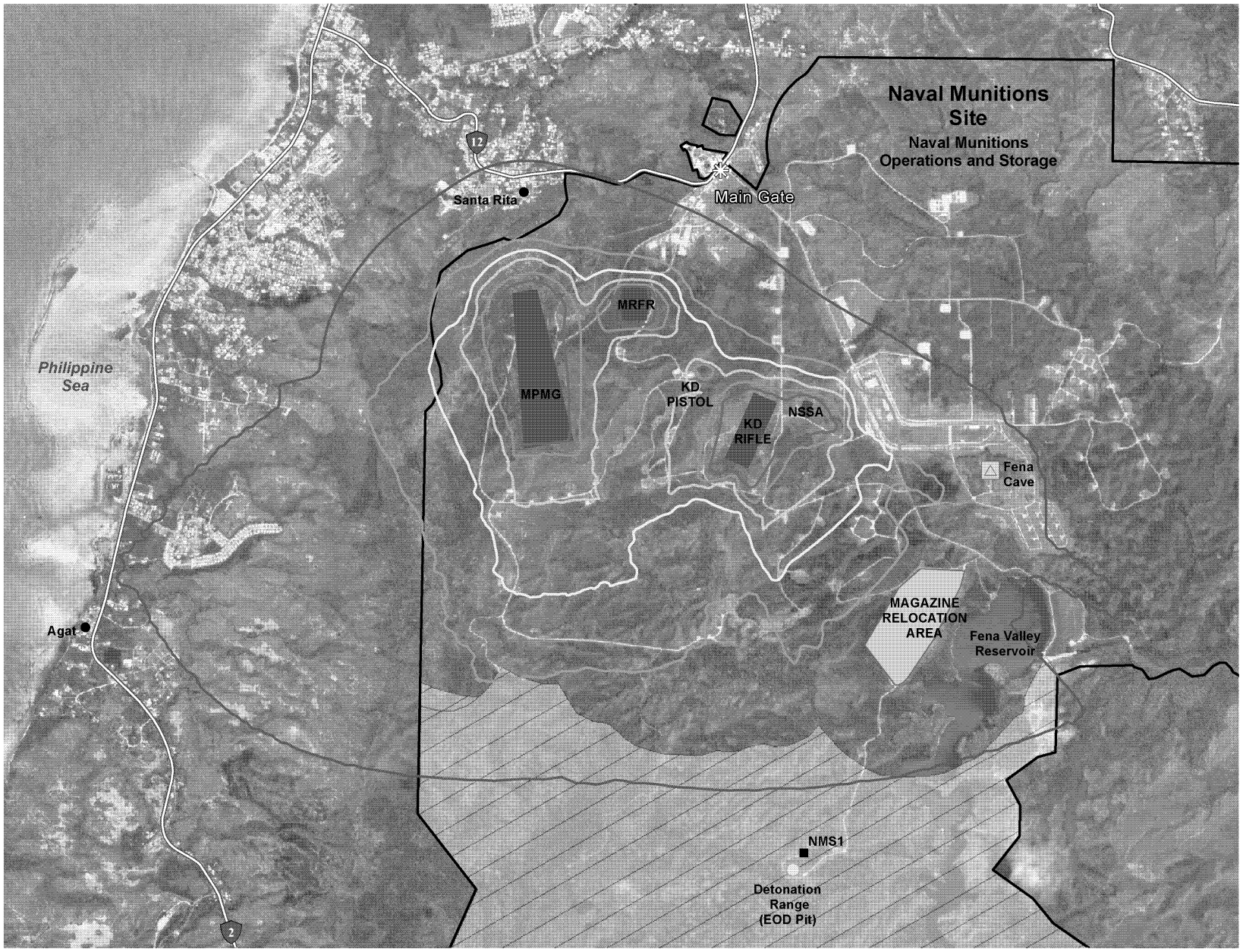
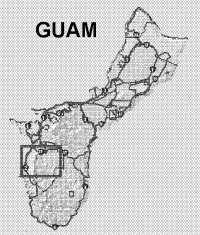


Figure 3.4-8
NMS North/South Alternative Operational Noise Assessment

Small Caliber ADNL Noise Zone
- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Live-Fire Range Area
- Munitions Magazine Relocation Area
- Detonation Range Area
- Cultural Landmark
- Landing Zone and ID
- Highway
- DoD Property

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet
0 500 1,000 Meters

PREPARED BY: Date: 6/21/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command PACIFIC

Date: 6/21/2013 Path: P:\PDD\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\06212013_Edits\3.4-8 NMS NS Small Caliber ADNL Noise_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

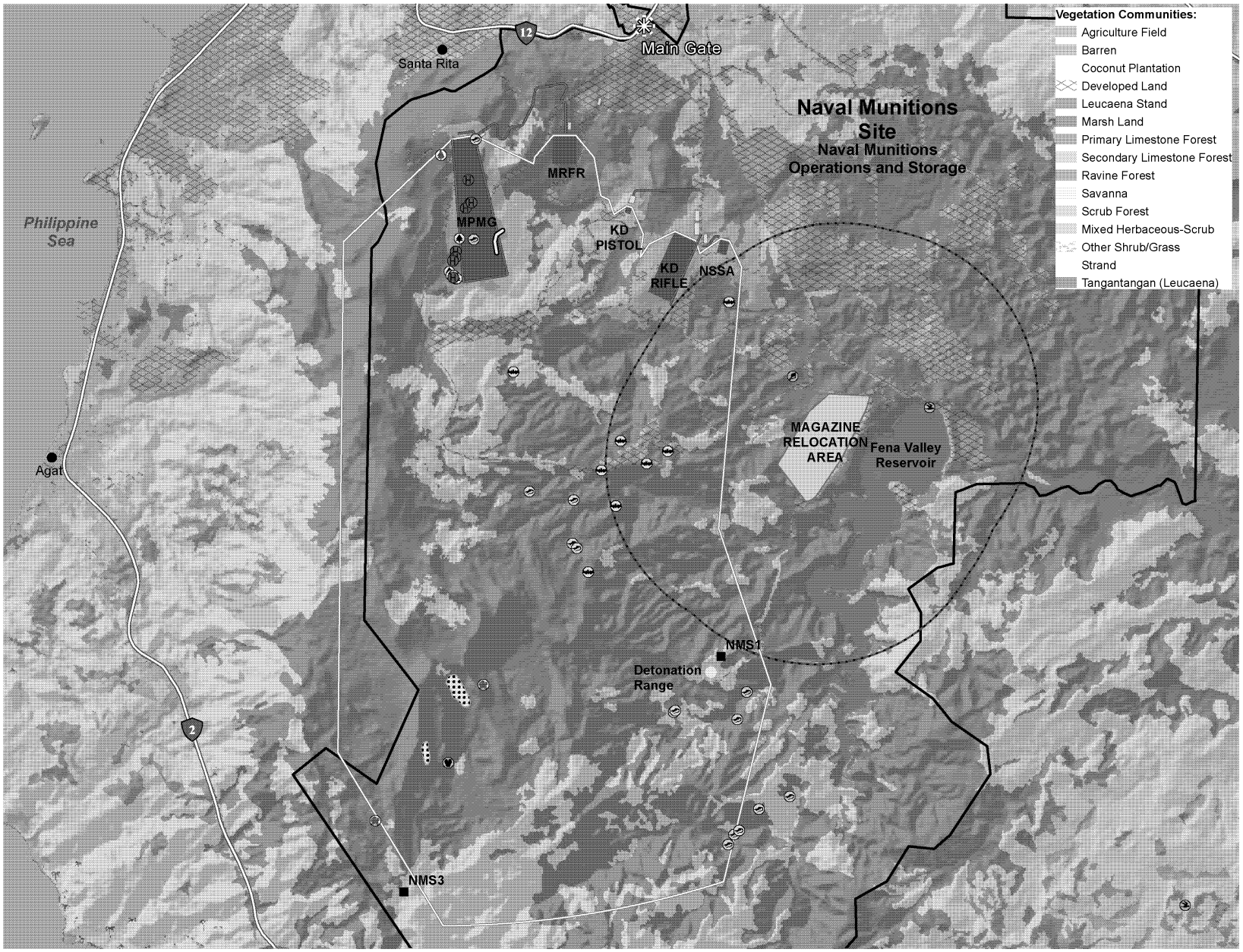


Figure 3.4-9
NMS North/South Alternative Vegetation and Special-Status Species

Special-Status Species Occurrence

Fauna:
- Fruit Bat
- Guam Tree Snail
- Moth Skink
- Pacific Slender-Toed Gecko
- Mariana Common Moorhen
- Mariana Eight-Spot Butterfly

Flora:
- Mariana Eight-Spot Butterfly Host Plant
- *Heritiera longipetiolata*

Known Plant SOGCN Locations
- *Tabernaemontana rotensis*
- *Merrilliodendron megacarpum*
- Cycad Area
- Merrilliodendron
- Landing Zone and ID
- Range Road
- Combined Surface Danger Zone
- Live-Fire Range Area
- Proposed Magazine ESQD Arc
- Munitions Magazine Relocation Area
- DoD Property

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet
0 500 1,000 Meters

PREPARED BY: Date: 6/24/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

NAVFAC Naval Facilities Engineering Command PACIFIC

Date: 6/24/2013 Path: P:\PDI\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.4-9 NMS NS Vegetation and SSS_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

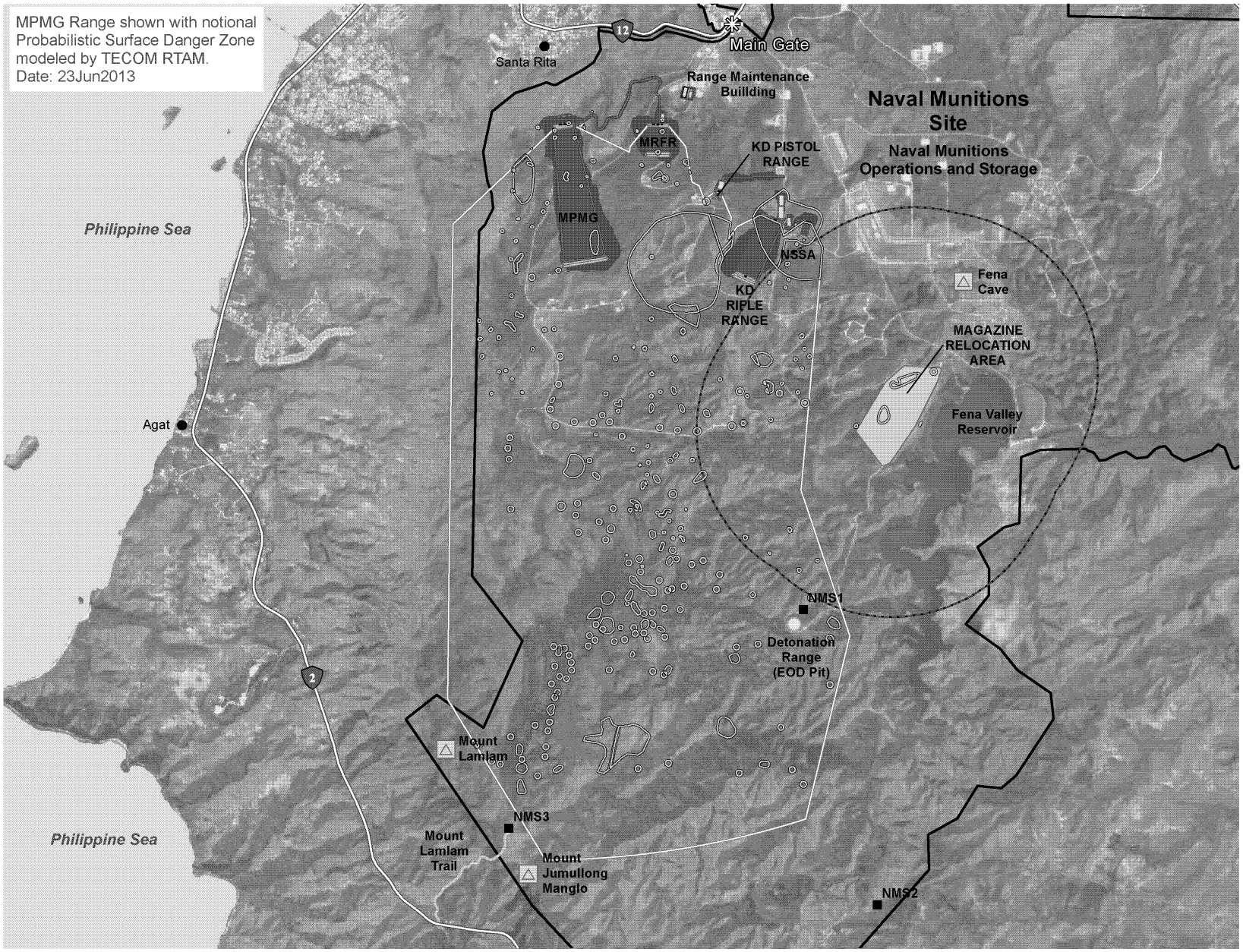
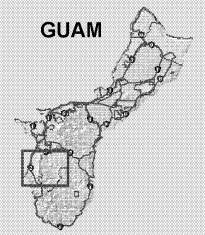


Figure 3.4-10
NMS North/South Alternative Cultural Resources

- Cultural Landmark
- Detonation Range Area
- Landing Zone and ID
- Cultural Resource Area
- Range Structure
- Parking Area
- Range Road
- Berm Area
- Range Support Area
- Combined Surface Danger Zone
- Live-Fire Range Area
- Proposed Magazine ESQD Arc
- Munitions Magazine Relocation Area
- Proposed Grading Contour (5 ft int)
- Hiking Trail (Mt. Lamlam)
- DoD Property

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet
0 500 1,000 Meters

PREPARED BY: Date: 6/23/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command PACIFIC

Date: 6/23/2013 Path: P:\PDI\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.4-10 NMS NS Cultural Resources.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

3.5 NMS L-SHAPED ALTERNATIVE

The NMS L-Shaped alternative (Figure 3.5-1 and Figure 3.5-2) would be divided between two locations. The MPMG Range and Range Maintenance Building would be located on the NMS and would be in the same respective locations identified for the NMS North/South alternative. Construction of the MPMG Range would cause the relocation of some existing munitions storage magazines to new magazines constructed on unaffected areas of the NMS. The MPMG SDZ would extend over non-DoD land to the east of the NMS.

All other ranges would be located on non-DoD property to the east of the NMS. The ranges located off the NMS would require the construction of an access road to allow all-weather operation.

Source: AECOM 2010.

Figure 3.5-1: Aerial View of Undeveloped Non-DoD Land Southeast of the NMS

3.5.1 Existing Conditions and Constraints

In addition to the NMS (described in Section 3.4.1), the L-Shaped alternative would use non-DoD land to the southeast (Figure 3.5-2). This rural land is largely undeveloped. There are some small agricultural fields, but the area primarily consists of rolling hills interspersed with wetland areas. A summary of existing conditions is shown in Figure 3.5-3.

3.5.2 Land/Sea/Air Space Availability

The NMS L-Shaped alternative would require the acquisition of approximately 914 ac (370 ha) of non-DoD land. Construction of the MPMG Range on the NMS would require the relocation of 66 munitions storage magazines with a NEW capacity of 13,723,254 lbs (6,224,763 kg) and 84,000 ft^2 (7,804 m^2) to create the necessary land area for the MPMG Range and associated SDZ. Infill at the NMS east of Fena Valley Reservoir would support a total NEW capacity of 32,384,600 lbs (14,689,407 kg) and 130, 000 ft^2 (12,077 m^2) (AECOM 2013).

Grading for the NMS L-Shaped alternative is shown in Appendix B and summarized in Table 3.5-1.

Table 3.5-1: Grading Volumes for the NMS L-Shaped Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	1,873,170	1,955,000	81,830	Fill	93
KD Rifle Range	115,964	111,461	4,503	Cut	22
MRF Range	43,643	21,401	22,242	Cut	11
NSSA Range	24,914	19,943	4,971	Cut	4
KD Pistol Range	18,936	8,073	10,864	Cut	2
Totals	**2,076,627**	**2,115,878**	**39,250**	**Fill**	**133**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend 2,965 ft (904 m) AGL. MARFORPAC has proposed the Naval Munitions R-7202 RA to deconflict range operations with air traffic. The proposed Naval Munitions R-7202 RA would overlay the approach/departure corridors Guam International Airport Runway 24/06. Mitigation of these impacts would be subject to ongoing actions between the Marines and FAA.

3.5.3 Supporting Infrastructure

Access to the NMS L-Shaped MPMG Range and Range Maintenance Building would be from the existing NMS Main Gate on Route 5. Existing NMS roadways would be used wherever possible, but a total of 1 mi (2 km) of new/improved roadway is required to support range operations on the NMS.

Access to the ranges to the east of the NMS would be via an access road that would connect to the existing Dandan Road (Figure 3.5-4). Within the eastern portion of the range complex, 3 mi (5 km) of roadway would be constructed to support training.

Planned utilities for the MPMG Range and Range Maintenance Building are the same as described in Section 3.4.3.

Utilities and communications for the remaining ranges east of the NMS would follow the constructed access road. In all cases, extension of single-phase, 13.8 kV lines from the points of connections would be accomplished via underground duct banks. The underground electrical lines would share the same trench with the IT/Comm lines when routed in the same access roads. Power to the site would be from the existing underground power line that runs along Dandan Road.

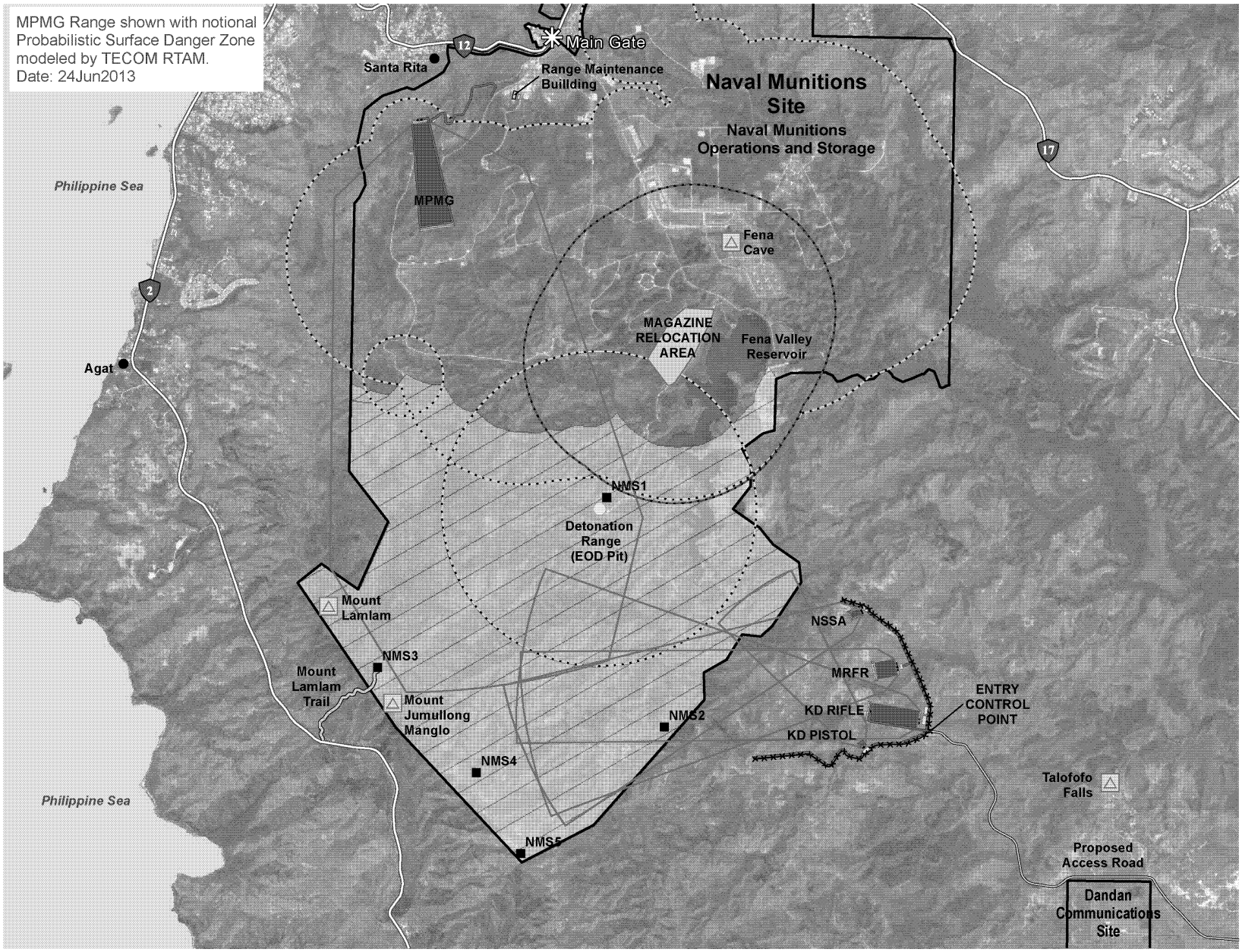


Figure 3.5-2
NMS L-Shaped Alternative

- Proposed Fence Line
- Proposed Range Structures
- Proposed Range Road
- Proposed Access Road
- Proposed Berm Area
- Proposed Range Support Area
- Live-Fire Surface Danger Zone (SDZ)
- Proposed Live-Fire Range Area
- Proposed Magazines ESQD Arc
- Munitions Magazine Relocation Area
- Cultural Landmark
- Landing Zone and ID
- Hiking Trail (Mt. Lamlam)
- Highway
- NMS ESDQ Arc
- DoD Property
- Non-Live-Fire Maneuver Training Area
- Wetlands (NMS and Private Lands)

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,500 5,000 Feet
0 600 1,200 Meters

PREPARED BY: Date: 6/24/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

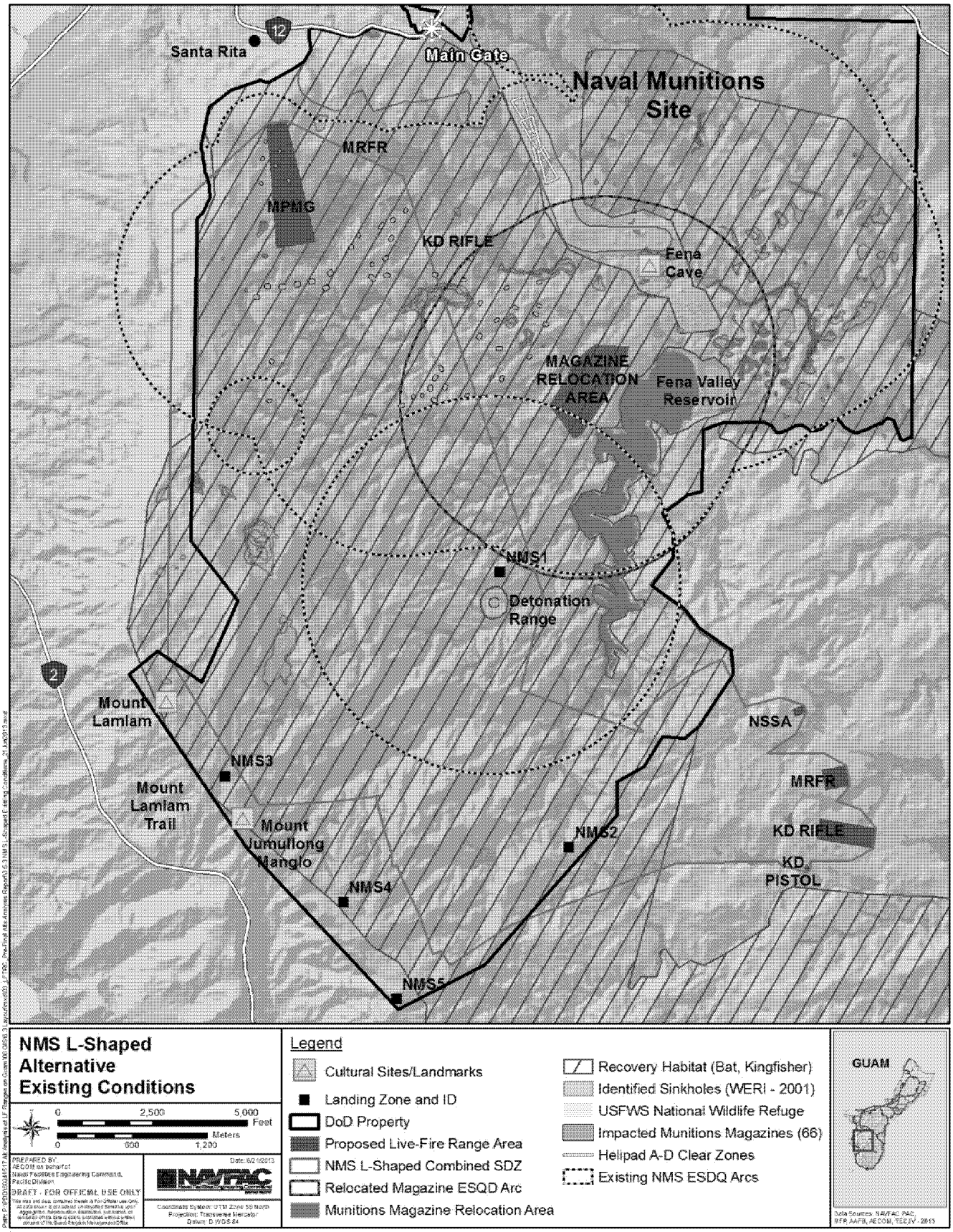


Figure 3.5-3: NMS L-Shaped Alternative Existing Conditions

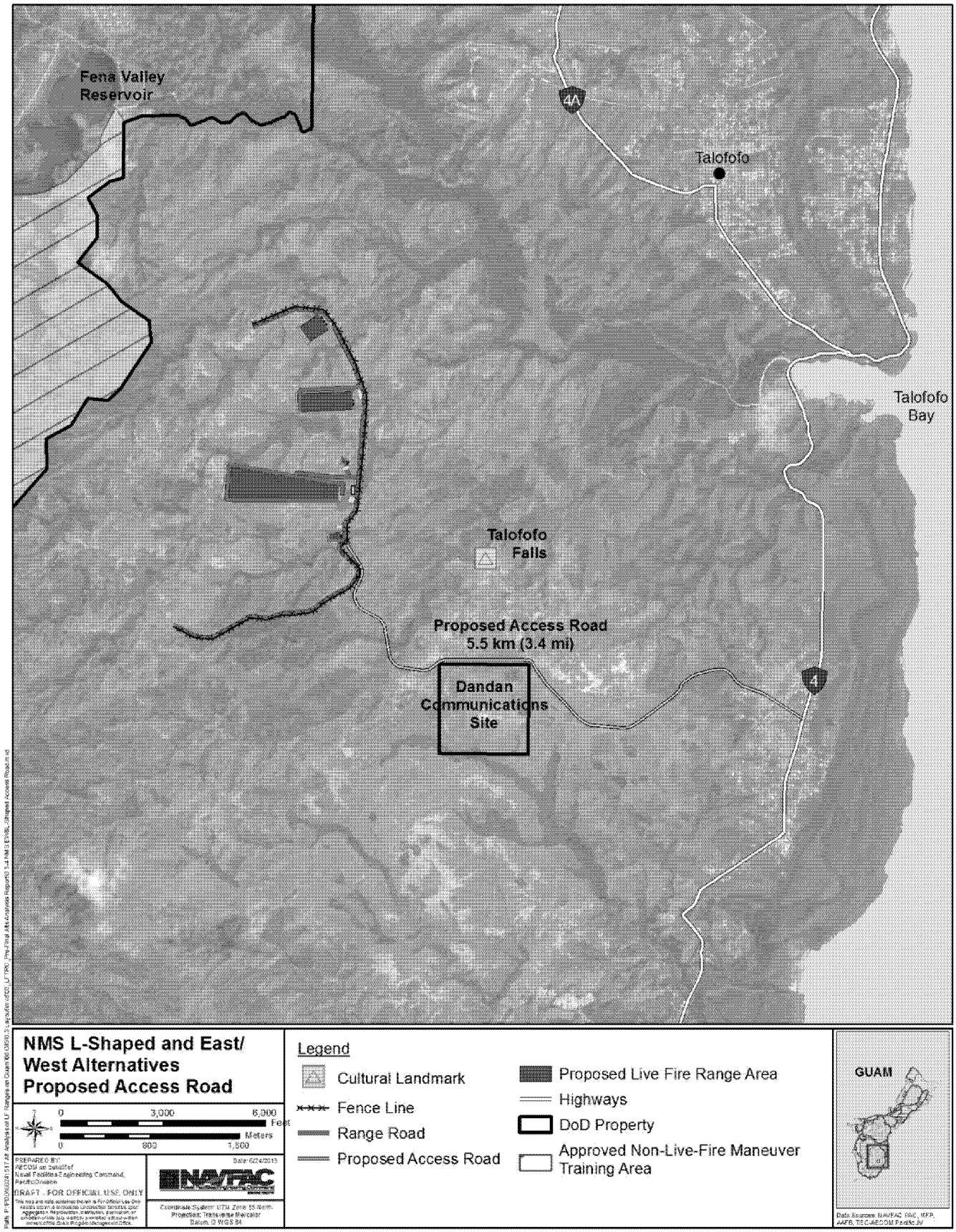


Figure 3.5-4: NMS L-Shaped and NMS East West Alternatives Proposed Access Road

The utilities plans for the NMS L-Shaped alternative are depicted in Figure 3.5-5 through Figure 3.5-8.

3.5.4 Land Use Compatibility

The NMS L-Shaped MPMG Range would displace 66 existing munitions storage magazines and would also encumber the planned location of 10 magazines with a NEW capacity of 5,000,000 lbs (2,267,962 kg) and 20,000 ft² (1,858 m²), as identified in the Guam and CNMI Military Relocation FEIS (JGPO 2010). These magazines were planned to support 8,600 Marines. This requirement will need to be revalidated due to the reduction in force size and change in force structure. In addition to the lost munitions storage, the MPMG SDZ would encumber the existing breacher house, sniper range, and the Ordnance Annex Detonation Range. The Detonation Range is used approximately 82 days per year to neutralize mines or UXO (Guam Relocation FEIS, July 2010). The Detonation Range also supports the round-the-clock emergency destruction of UXO. This emergency destruction mission would take precedence over MPMG training and would cause a cessation of training on the MPMG Range during emergency destructions. In addition to existing uses, the LFTRC SDZ would also encumber the NMS 1 and 2 Landing Zones, and 2,303 ac (932 ha) of the Non-Live-Fire Maneuver area identified in the Guam and CNMI Military Relocation FEIS (JGPO 2010). Use of these facilities/areas would be prohibited when the LFTRC is supporting live-fire training. While the LFTRC SDZ would not directly encumber the NMS 3, 4, and 5 Landing Zones, its proximity would present operational flight limitations should the surface winds dictate a flight path into or near the SDZ for takeoff and landing maneuvers.

An Operational Noise Assessment of the NMS L-Shaped alternative, conducted by the USAPHC, concluded that the Noise Zones (Figure 3.5-9) would extend beyond the boundary, but the activity would be compatible with the surrounding land uses. Zone 1 would extend beyond the northern boundary from the MPMG Range activity. Residential properties are located within Zone 1; however, noise-sensitive land uses within Zone 1 would be considered compatible. Within the off-base Zone 2, the land is undeveloped and does not contain any noise-sensitive land uses. Although the Noise Zones for the eastern portion of the NMS-L Shaped alternative would extend beyond the boundary, the area surrounding the site is undeveloped and would not contain any noise-sensitive land uses. Within NMS, the Noise Zones would not encompass any noise-sensitive land uses.

3.5.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.5-10 and Figure 3.5-11). The significance of the impacts and potential mitigation listed in this report will be addressed in the SEIS.

The NMS L-Shaped alternative would affect the following terrestrial biological resources:

- Clearing of primary limestone forest, ravine forest, and forested wetland, which serve as potential habitat for special-status species. A large area of limestone forest at the MPMG Range that is relatively undisturbed and not substantially impacted by ungulates would be removed. Some patches of the Guam SOGCN tree Merrilliodendron megacarpum would be removed.
- Removal of large areas of the Overlay Refuge, which would reduce natural resource conservation benefits.

- The proposed southern fenceline traverses the GovGuam Bolanos Conservation Area and may affect conservation efforts there.
- Clearing of areas currently used by the Mariana swiftlet for foraging.
- Mortality of the Guam-listed Pacific slender-toed gecko at the MPMG Range.
- Clearing of suitable habitat used by the ESA-listed Mariana fruit bat, and disturbance of suitable habitat that could be used by the fruit bat in additional areas around the LFTRC.
- Removal of host plants for the ESA-candidate species Mariana eight-spot butterfly would occur, although the butterfly itself has not been observed in the area.

Biological impacts would include the following:

- Impacts on the Mariana common moorhen at one pond just outside the MPMG Range that would be impacted by activity and noise from range operations.
- Impacts on the Mariana fruit bat from activity and noise.
- Invasive species impacts on all special-status species.

For cultural resources, construction of the NMS L-Shaped alternative would potentially result in direct impacts on 11 NRHP-eligible archaeological sites. Ten sites that have not been evaluated for listing on the NRHP would also be affected. One building covered under a program comment would be demolished. In addition, up to 264 archaeological sites and five structures may be impacted during operations.

3.5.6 Public Access

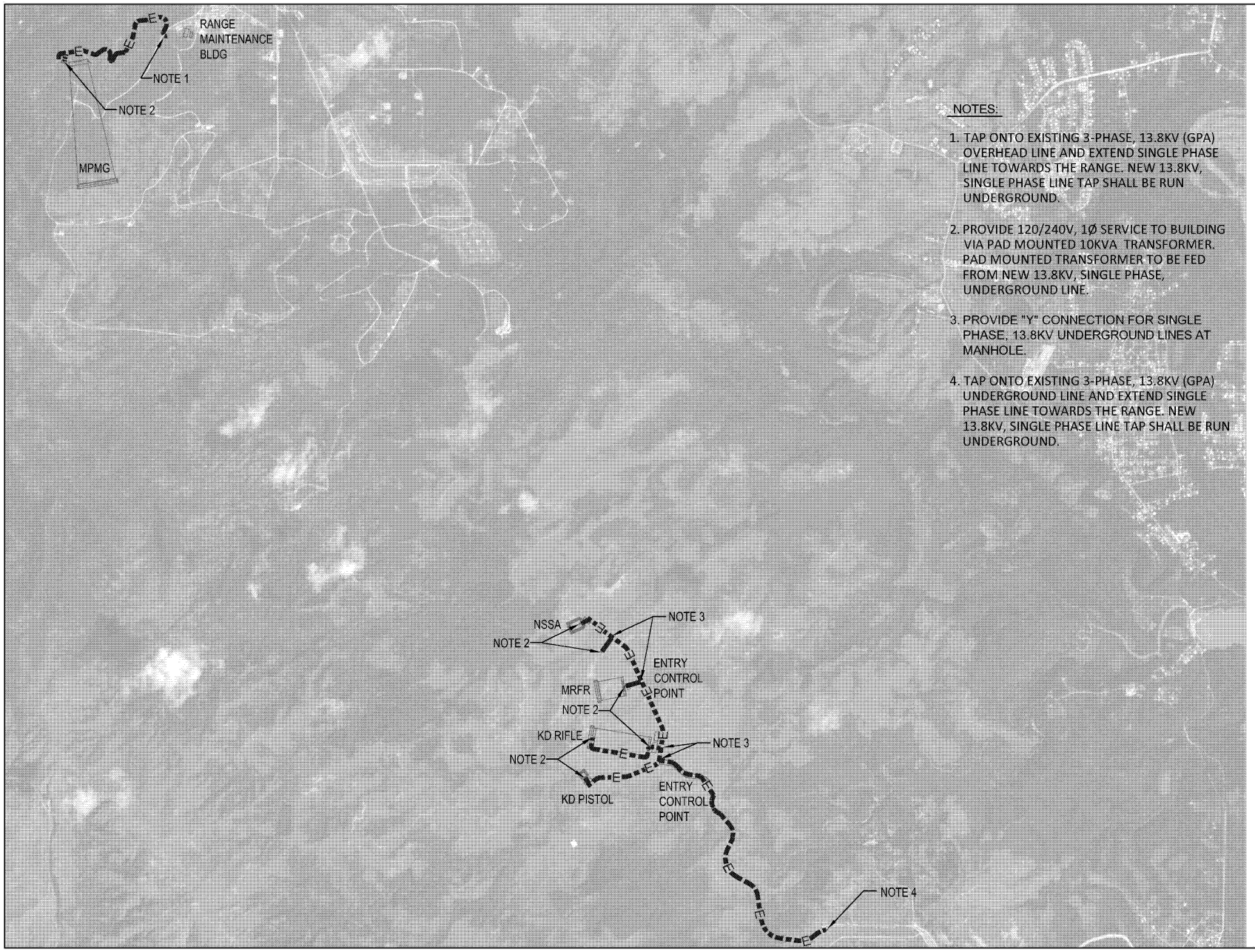
Public access to the NMS is currently restricted. Public access would also be restricted from 914 ac (370 ha) of the eastern ranges and their associated SDZs. There would be no impacts on the Mt. Lamlam Trail under this alternative.

3.5.7 Range Transients

The existing fencing and ECP would prevent unauthorized persons from entering the LFTRC and the SDZ through the NMS. The extremely steep and heavily vegetated terrain on the eastern, southern, and western boundaries of the NMS reduces the likelihood of unauthorized personnel access.

Proposed fencing on the southern, eastern, and northern sides of the eastern ranges would tie into restrictive terrain on the western side of the ranges to reduce the likelihood of unauthorized personnel entering the ranges and SDZ.

If approved by the FAA, the proposed Naval Munitions R-7202 RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live-fire training would cease until the aircraft is clear of the SDZ.



NOTES:

1. TAP ONTO EXISTING 3-PHASE, 13.8KV (GPA) OVERHEAD LINE AND EXTEND SINGLE PHASE LINE TOWARDS THE RANGE. NEW 13.8KV, SINGLE PHASE LINE TAP SHALL BE RUN UNDERGROUND.
2. PROVIDE 120/240V, 1Ø SERVICE TO BUILDING VIA PAD MOUNTED 10KVA TRANSFORMER. PAD MOUNTED TRANSFORMER TO BE FED FROM NEW 13.8KV, SINGLE PHASE, UNDERGROUND LINE.
3. PROVIDE "Y" CONNECTION FOR SINGLE PHASE, 13.8KV UNDERGROUND LINES AT MANHOLE.
4. TAP ONTO EXISTING 3-PHASE, 13.8KV (GPA) UNDERGROUND LINE AND EXTEND SINGLE PHASE LINE TOWARDS THE RANGE. NEW 13.8KV, SINGLE PHASE LINE TAP SHALL BE RUN UNDERGROUND.

Figure 3.5-5
NMS L-Shaped Alternative Electrical Plan

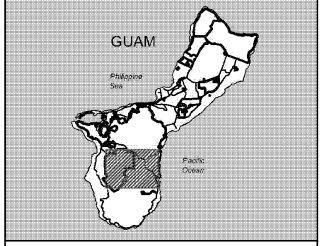
Legend

E NEW 13.8 KV, 1Ø UNDERGROUND LINE

NEW 120/240V 1Ø UNDERGROUND LINE FROM TRANSFORMER TO BUILDING

*All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 m 1600 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

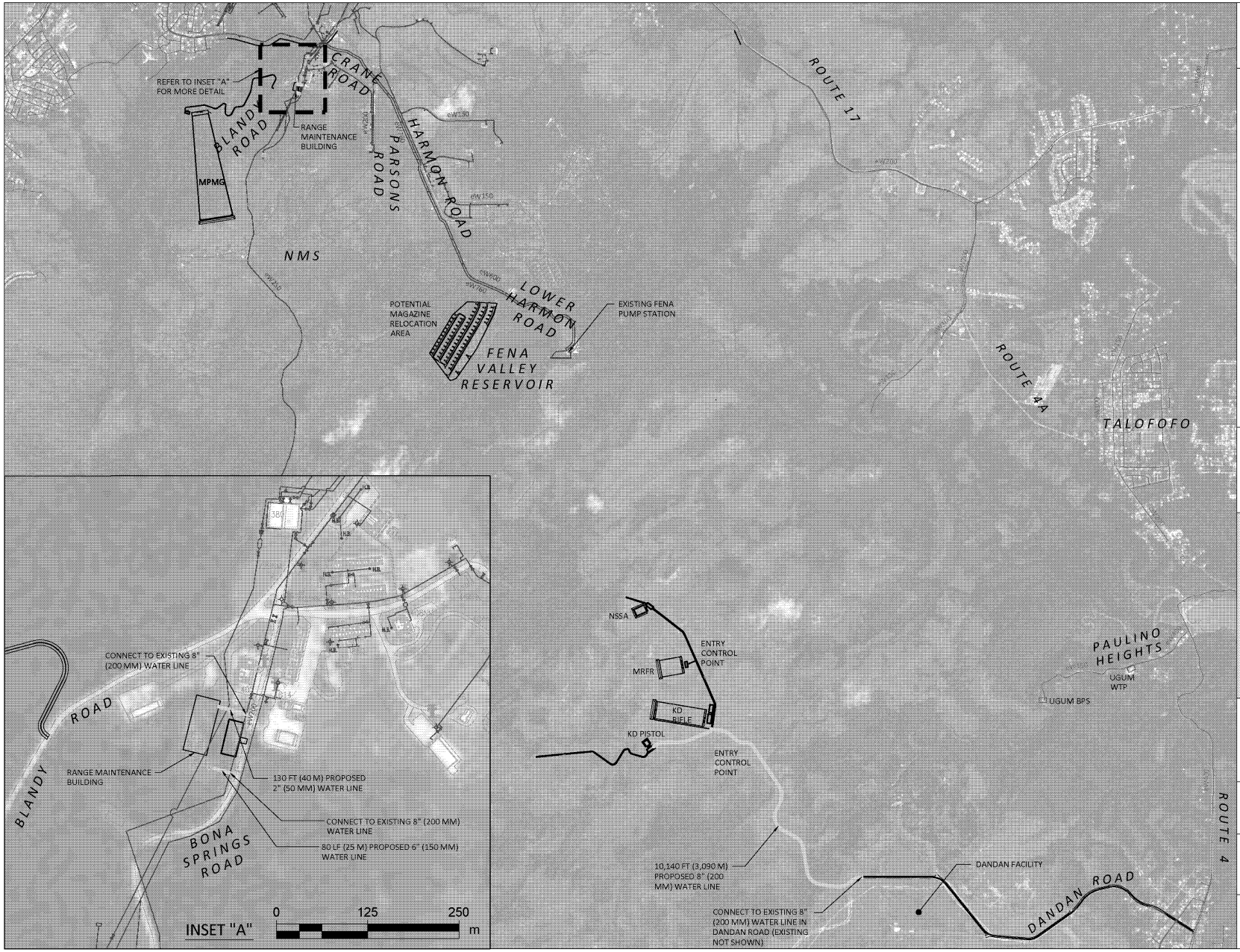


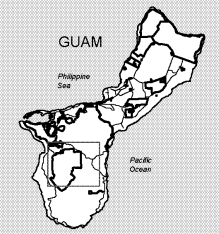
Figure 3.5-6
NMS L-Shaped Alternative Water Plan

- PROPOSED 8" (200 MM) WATER LINE
- EXISTING DOD WATER LINE
- EXISTING GWA WATER LINE
- DOD PROPERTY LINE
- PROPOSED FIRE HYDRANT

Potable water service is required for the Range Maintenance Building, KD Pistol Range and KD Rifle Range only.

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 875 1750 m

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: June 2013

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

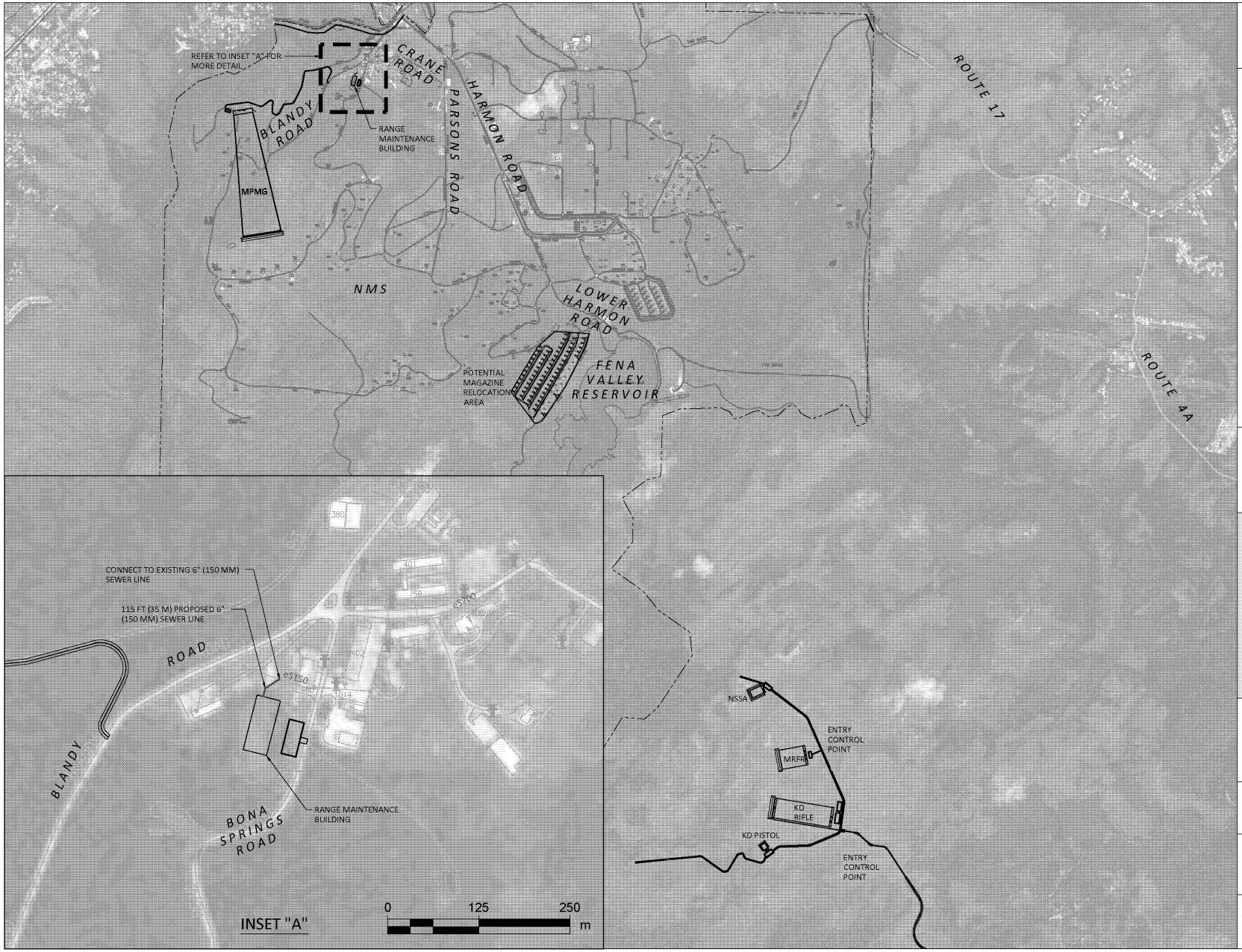


Figure 3.5-7
NMS L-Shaped Alternative Wastewater Plan

PROPOSED 8" (200 MM) SEWER LINE

EXISTING DOD SEWER LINE

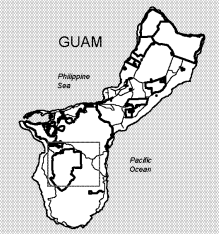
EXISTING DOD MANHOLE

DOD PROPERTY LINE

Sewer collection is required for the Range Maintenance Building only.

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 750 1500 m

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: June 2013

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

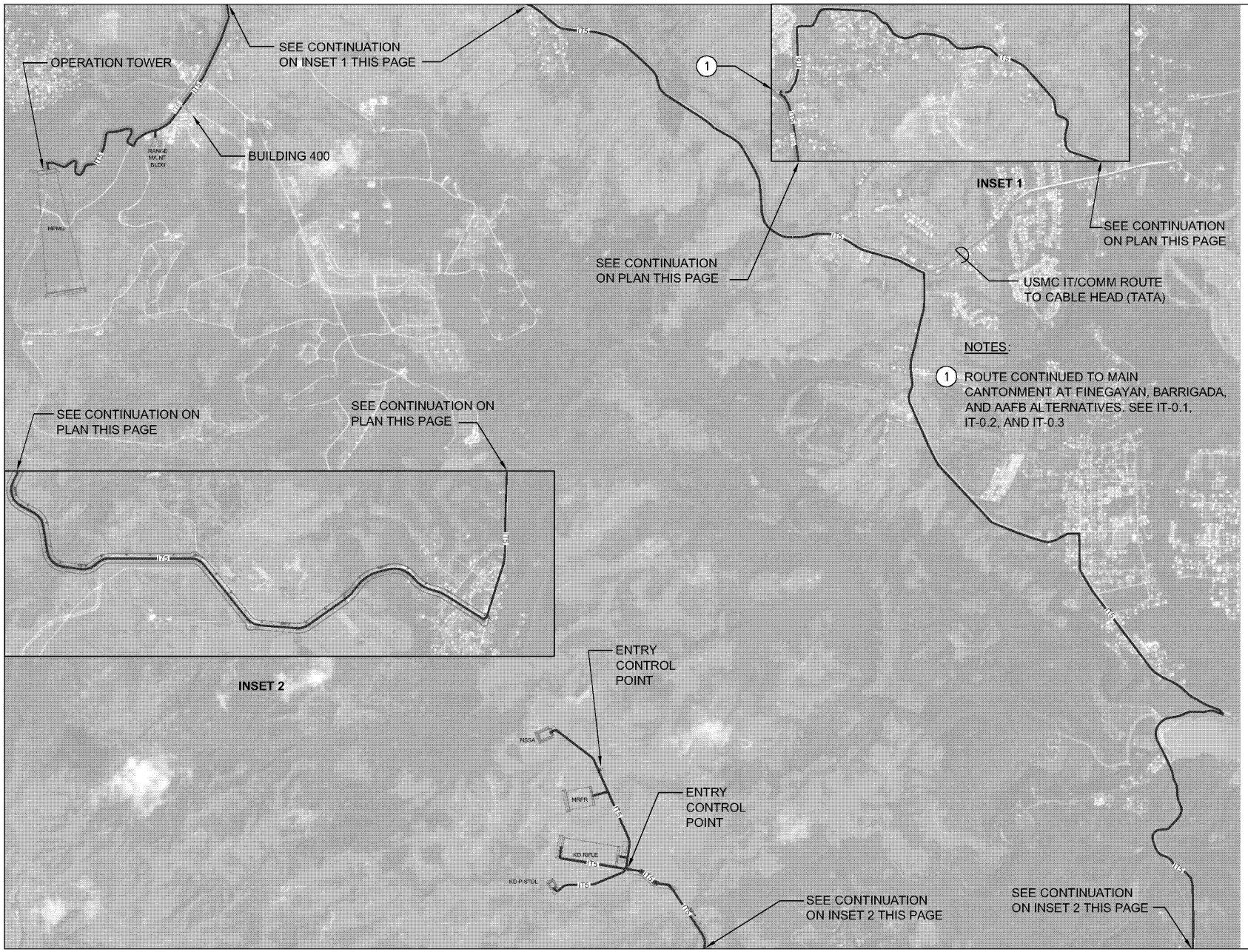


Figure 3.5-8
NMS L-Shaped Alternative
IT/COMM Plan

IT5 — DISTRIBUTION TO LFTRC - DB1

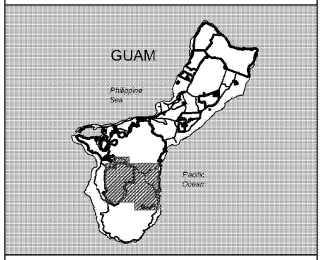
IT5 — USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

DISA COMM ROUTE TO TATA CLF - DB1

DB# DUCT BANK TYPE - SEE DUCT BANK AND CABLE SCHEDULE ON APPENDIX D FOR REQUIREMENTS

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 m 1600 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

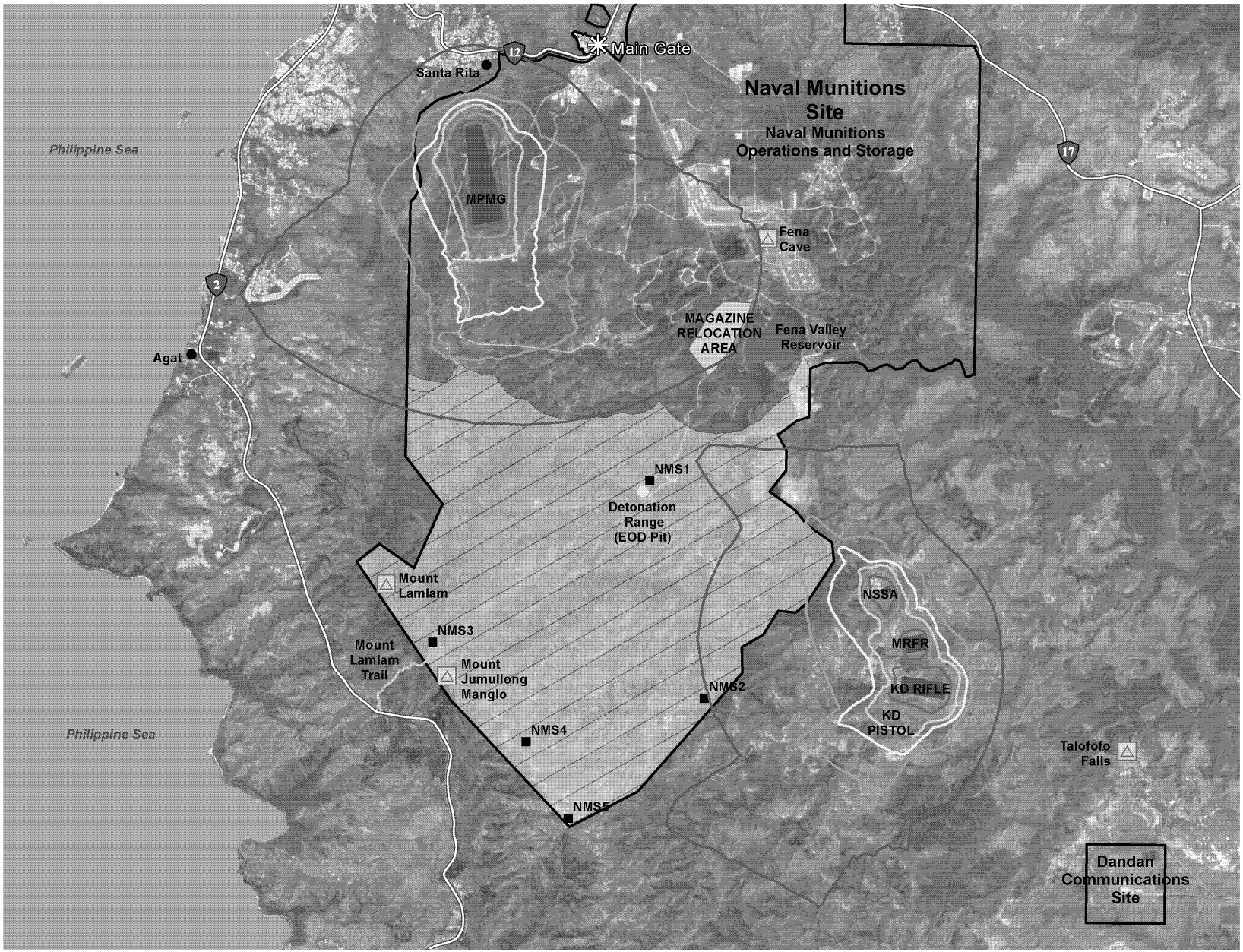


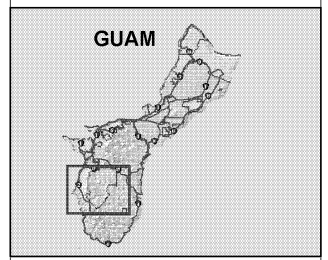
Figure 3.5-9
NMS L-Shaped Alternative Operational Noise Assessment

Small Caliber ADNL Noise Zone

- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Proposed Live Fire Range Area
- Munitions Magazine Relocation Area
- Cultural Landmark
- Landing Zone and ID
- Hiking Trail (Mt. Lamlam)
- Highway
- DoD Property
- Wetlands (NMS and Private Lands)
- Approved Non-Live-Fire Maneuver Training Area

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,500 5,000 Feet
0 600 1,200 Meters

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

Date: 6/24/2013

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command NAVFAC Pacific

Date: 6/24/2013 Path: P:\2\D\60241517 Alt Analysis of LF Ranges on Guam\05 GIS\9.3 Layout\mxd\09_LFTRC_Pre-Final Alts Analysis Report\3.5-9 NMS L-Shaped Small Caliber ADNL Noise_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

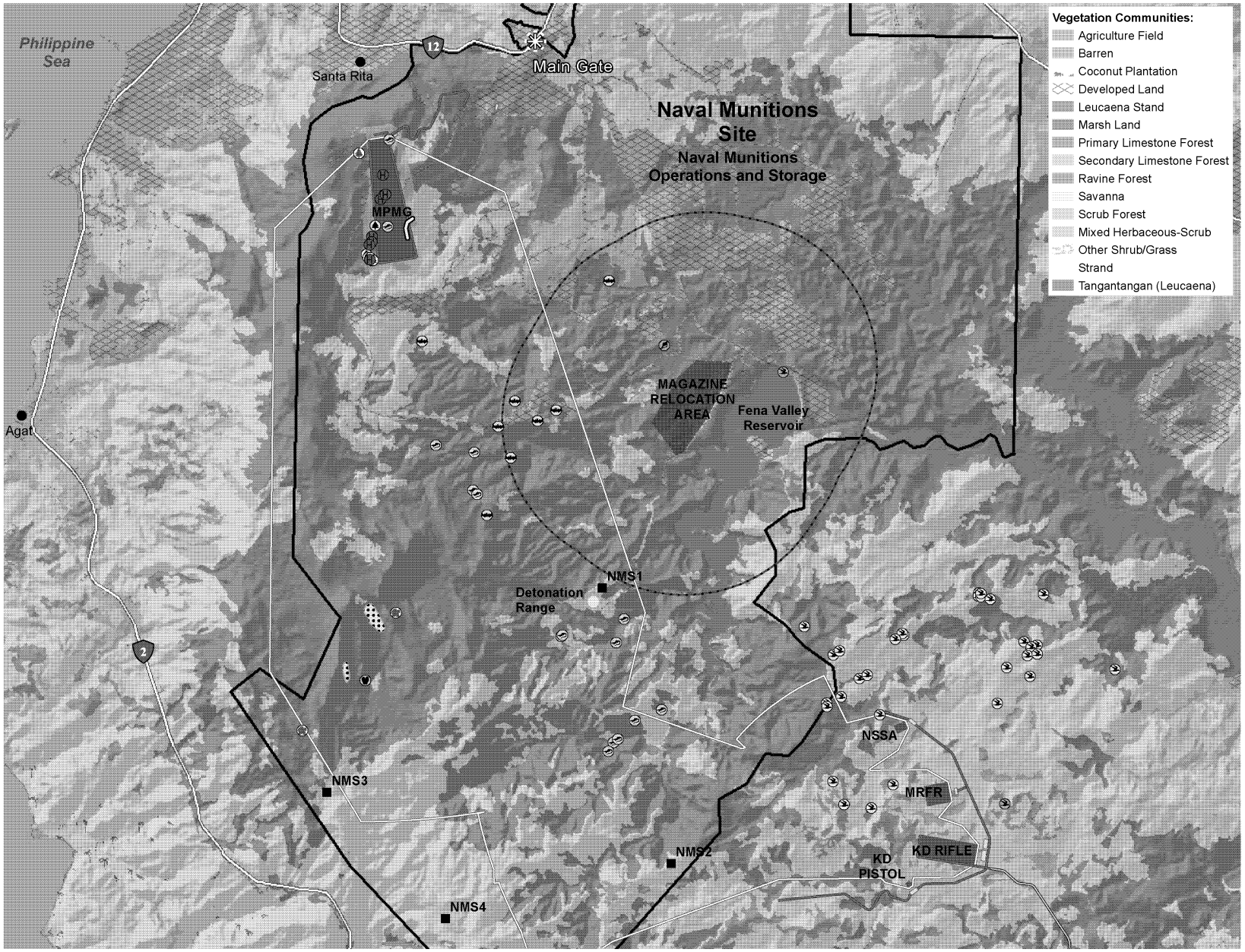


Figure 3.5-10
NMS L-Shaped Vegetation and Special-Status Species

Special Status Species Occurrence

Fauna:
- Fruit Bat
- Guam Tree Snail
- Moth Skink
- Pacific Slender-Toed Gecko
- Mariana Common Moorhen
- Mariana Swiftlet
- Mariana Eight-Spot Butterfly

Flora:
- Mariana Eight-Spot Butterfly Host Plant
- *Heritiera longipetiolata*

Known Plant SOGCN Locations
- *Tabernaemontana rotensis*
- *Merrilliodendron megacarpum*
- Cycad Area
- Merrilliodendron
- Landing Zone and ID
- Proposed Range Road
- Proposed Access Road
- NMS L-Shaped Combined SDZ
- Proposed Live-Fire Range Area
- Relocated Magazine ESQD Arc
- DoD Property

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

GUAM

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet
0 500 1,000 Meters

PREPARED BY: Date: 6/24/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command PACIFIC

Date: 6/24/2013 Path: P:\PDD60\24517 Alt Analysis on LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.5-10 NMS L-Shaped Vegetation and SSS_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

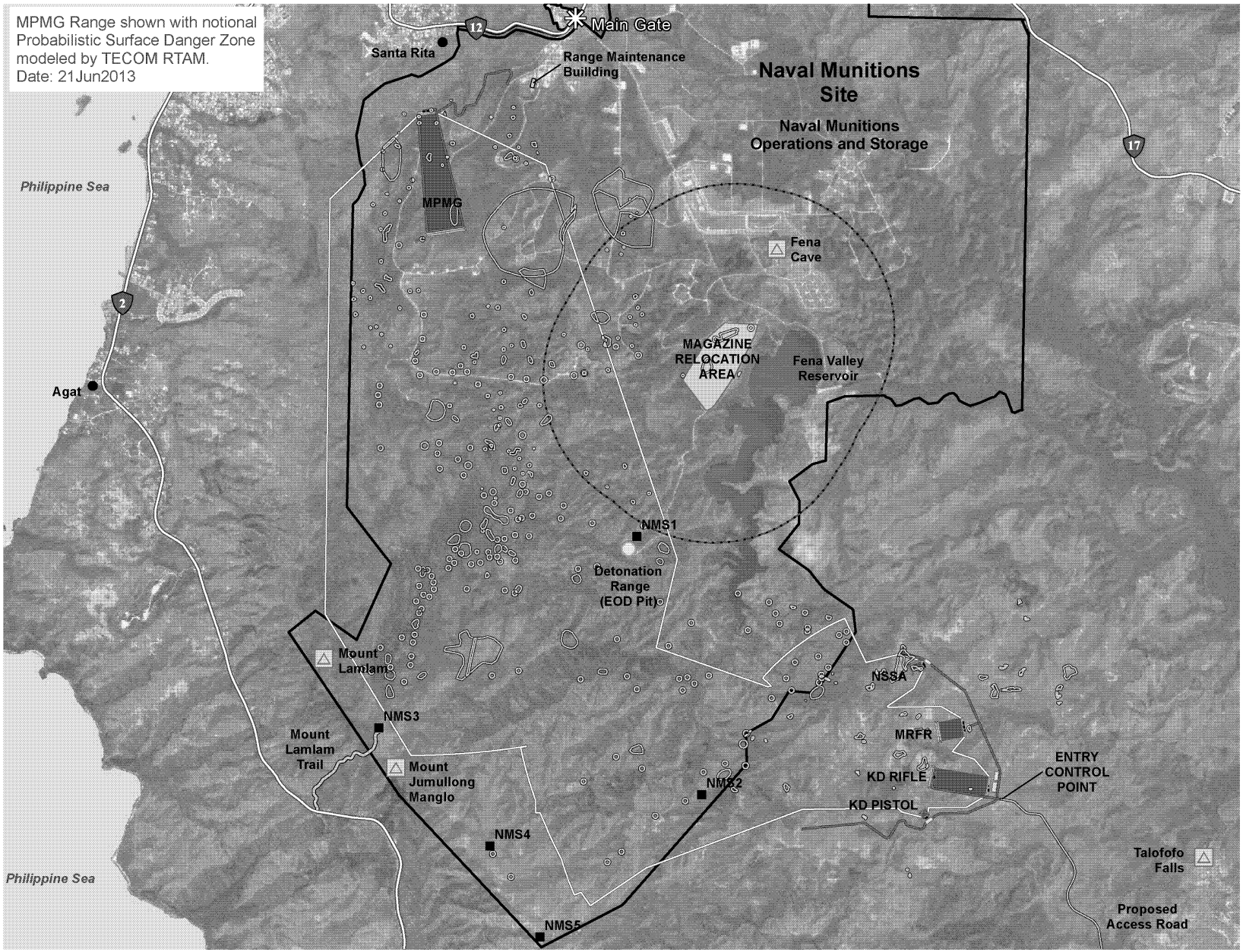
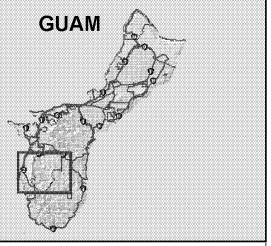


Figure 3.5-11
NMS L-Shaped Alternative
Cultural Resources

- Cultural Resource Area
- Proposed Range Structures
- Proposed Range Road
- Proposed Access Road
- Proposed Berm Area
- Proposed Range Support Area
- NMS L-Shaped Combined SDZ
- Proposed Live-Fire Range Area
- Proposed Magazines ESQD Arc
- Munitions Magazine Relocation Area
- Cultural Landmark
- Landing Zone and ID
- Hiking Trail (Mt. Lamlam)
- Highway
- DoD Property
- Wetlands (NMS and Private Lands)

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,500 5,000 Feet
0 600 1,200 Meters

PREPARED BY: Date: 6/21/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command NAVFAC Pacific

Date: 6/21/2013 Path: P:\PDN\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\8.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.5-11 NMS L-Shaped Cultural Resources.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

3.5.8 Operational Efficiency

The proposed NMS L-Shaped alternative would locate ranges and facilities in two locations. This would reduce the efficiency in range maintenance and management.

3.5.9 Orientation

The generally southern orientation of the MPMG Range would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun. The western orientation of the remaining ranges would result in the loss of daylight training time in the late afternoon. The low sun, setting in the west, would affect the training audience's ability to engage targets and limit the late afternoon use of magnifying optics to avoid damage to eyesight.

3.5.10 Life Cycle Cost

The life cycle cost for the NMS L-Shaped alternative is $616,174,000. See Table 2.6-1 for cost breakdown.

3.5.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the NMS L-Shaped alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges April 2024
- MPMG Range July 2019

1 THIS PAGE INTENTIONALLY LEFT BLANK

3.6 NMS EAST/WEST ALTERNATIVE

The NMS East/West alternative (Figure 3.6-1) would be located in a single location on non-DoD land to the southeast of the NMS. The ranges would be oriented to the west and the composite SDZ would extend over portions of the NMS. The range complex would require the construction of an access road to allow all-weather operation. The same access road developed for the L-Shaped alternative would also support this alternative.

3.6.1 Existing Conditions and Constraints

The existing conditions and constraints described in Section 3.5.1 apply to this alternative as well. A summary of existing conditions is shown in Figure 3.6-2.

3.6.2 Land/Sea/Air Space Availability

The NMS East/West alternative would require the acquisition of approximately 1,894 ac (766 ha) of non-DoD land.

Grading for the NMS East/West alternative is shown in Appendix B and summarized in Table 3.6-1.

Table 3.6-1: Grading Volumes for the NMS East/West Alternative

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
MPMG Range	724,940	682,116	42,824	Cut	93
KD Rifle Range	145,807	143,251	2,557	Cut	25
MRF Range	79,378	79,158	220	Cut	12
NSSA Range	334	51,953	51,619	Fill	4
KD Pistol Range	2,727	2,810	83	Fill	2
Totals	**953,186**	**959,288**	**6,102**	**Fill**	**136**

Source: Provided by AECOM.

The vertical hazard associated with this alternative would extend 2,965 ft (904 m) AGL. MARFORPAC has proposed the Naval Munitions R-7202 RA to deconflict range operations with air traffic. The proposed Naval Munitions R-7202 RA would overlay the Guam International Airport Runway 24/06 approach and departure operations. Mitigation of these impacts is subject to ongoing actions between the Marines and FAA.

3.6.3 Supporting Infrastructure

Access to the LFTRC would be from the route described in Section 3.5.3. Within the range complex, 5 mi (9 km) of roadway would be constructed to support training.

Utilities and communications for this alternative would follow the constructed access road and are the same as those described in Section 3.5.3.

The utilities plans for the NMS East/West alternative are depicted in Figure 3.6-3 through Figure 3.6-6.

3.6.4 Land Use Compatibility

The LFTRC SDZ would encumber the NMS 2 and 4 Landing Zones; and 1,700 ac (688 ha) of the Non-Live -Fire Maneuver area identified in the 2010 Guam Relocation FEIS. Use of these facilities/areas would be prohibited when the LFTRC is supporting live-fire training. While the LFTRC SDZ would not directly encumber the NMS 1

and 5 Landing Zones, its proximity would present operational flight limitations should the surface winds dictate a flight path into or near the SDZ for takeoff and landing maneuvers.

An Operational Noise Assessment of the NMS East/West alternative, conducted by the USAPHC, concluded that the Noise Zones (Figure 3.6-7) would extend beyond the NMS and proposed land expansion area boundaries, but the area surrounding the site is undeveloped and would not contain any noise-sensitive land uses. Within the NMS, the Noise Zones would not encompass any noise-sensitive land uses.

3.6.5 Environmental Considerations

Environmental considerations include potential impacts on terrestrial biological and cultural resources as a result of range construction and operations (Figure 3.6-8 and Figure 3.6-9). The significance of the impacts and potential mitigation listed in this report will be addressed in the SEIS. All construction and operation activities would have the potential to increase the biological impacts associated with the spread of invasive species, with resulting threats to special-status species, as well as the increased potential of wildfire.

The NMS East/West alternative would affect the following terrestrial biological resources:

- Clearing of important vegetation communities such as ravine forest, herbaceous wetland, and small areas of primary limestone forest.
- The proposed southern fenceline would traverse the GovGuam Bolanos Conservation Area and may affect conservation efforts there.
- Clearing of areas currently used by the Mariana swiftlet for foraging.

Biological impacts would include the following:

- Loss of seasonal ponds in the area that may be used by the Mariana common moorhen. Surveys during the wet season would be required to determine if the species occurs in the area.
- Invasive species impacts on all special-status species.
- Wildfire impacts on special-status species habitat.

For cultural resources, construction of the NMS East/West alternative would potentially result in direct impacts on nine historic properties (archaeological sites). In addition, indirect impacts on as many as 98 historic properties could occur during operations.

3.6.6 Public Access

Public access to the NMS is currently restricted. Public access would also be restricted from the 1,894 ac (766 ha) of the ranges and their associated SDZs to the east of the NMS.

There would be no impacts on the Mt. Lamlam Trail under this alternative.

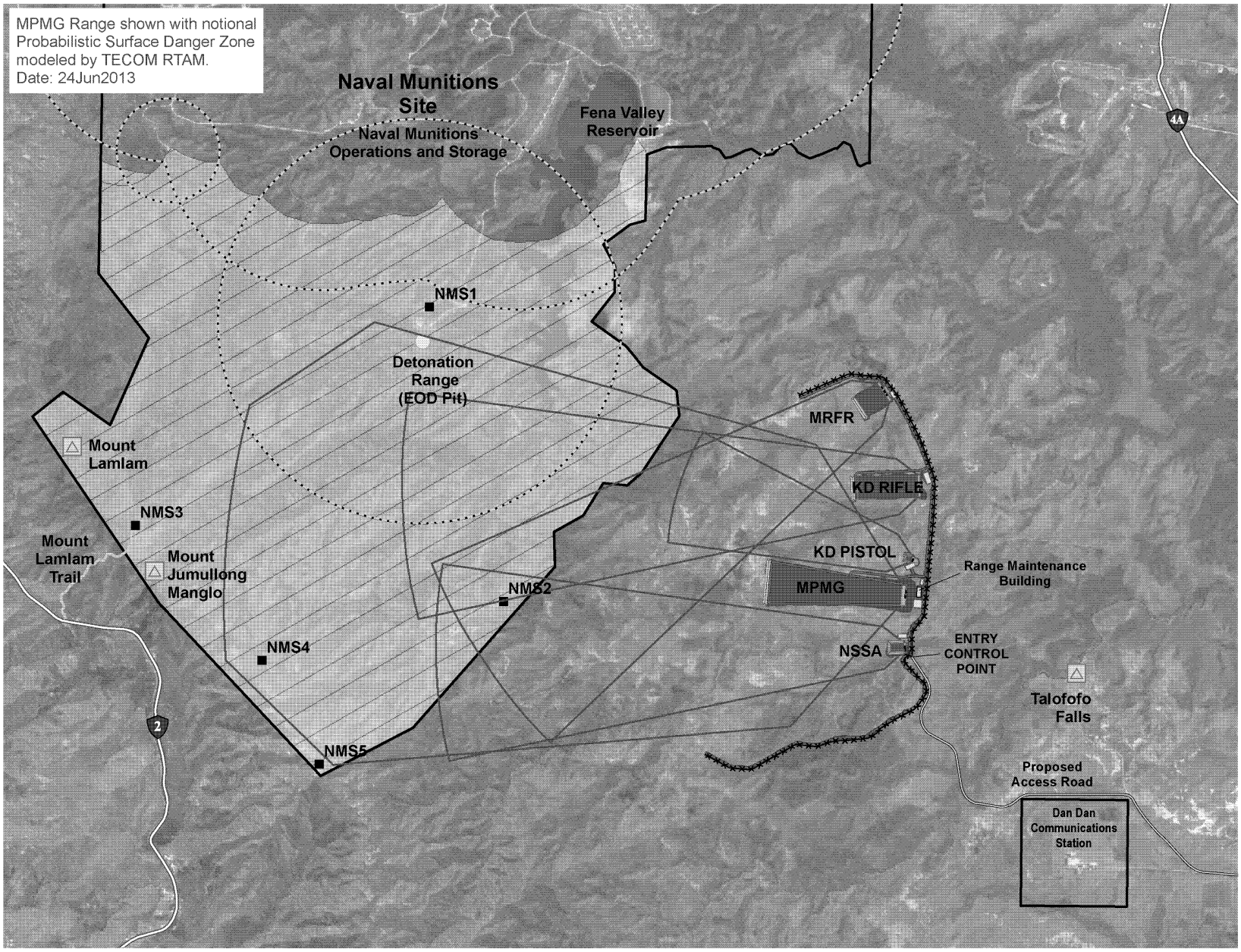
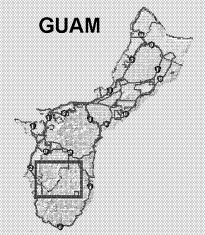


Figure 3.6-1
NMS East/West Alternative

- Fence Line
- Proposed Access Road
- Parking Area
- Range Structures
- Range Road
- Berm Area
- Range Support Area
- Surface Danger Zone (SDZ)
- Live-Fire Range Area
- Proposed Grading Contour (5 ft int)
- Cultural Landmark
- Landing Zone and ID
- Detonation Range Area
- Existing Hiking Trail (Mt. Lamlam)
- Highway
- Existing NMS ESDQ Arc
- DoD Property
- Approved Non-Live-Fire Maneuver Training Area
- Wetlands (NMS and Private Lands)

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,500 3,000 Feet
0 400 800 Meters

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

Date: 6/24/2013

DRAFT - FOR OFFICIAL USE ONLY

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Date: 6/24/2013 Path: P:\PD\60\24517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.6-1 NMS EW Alternative_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

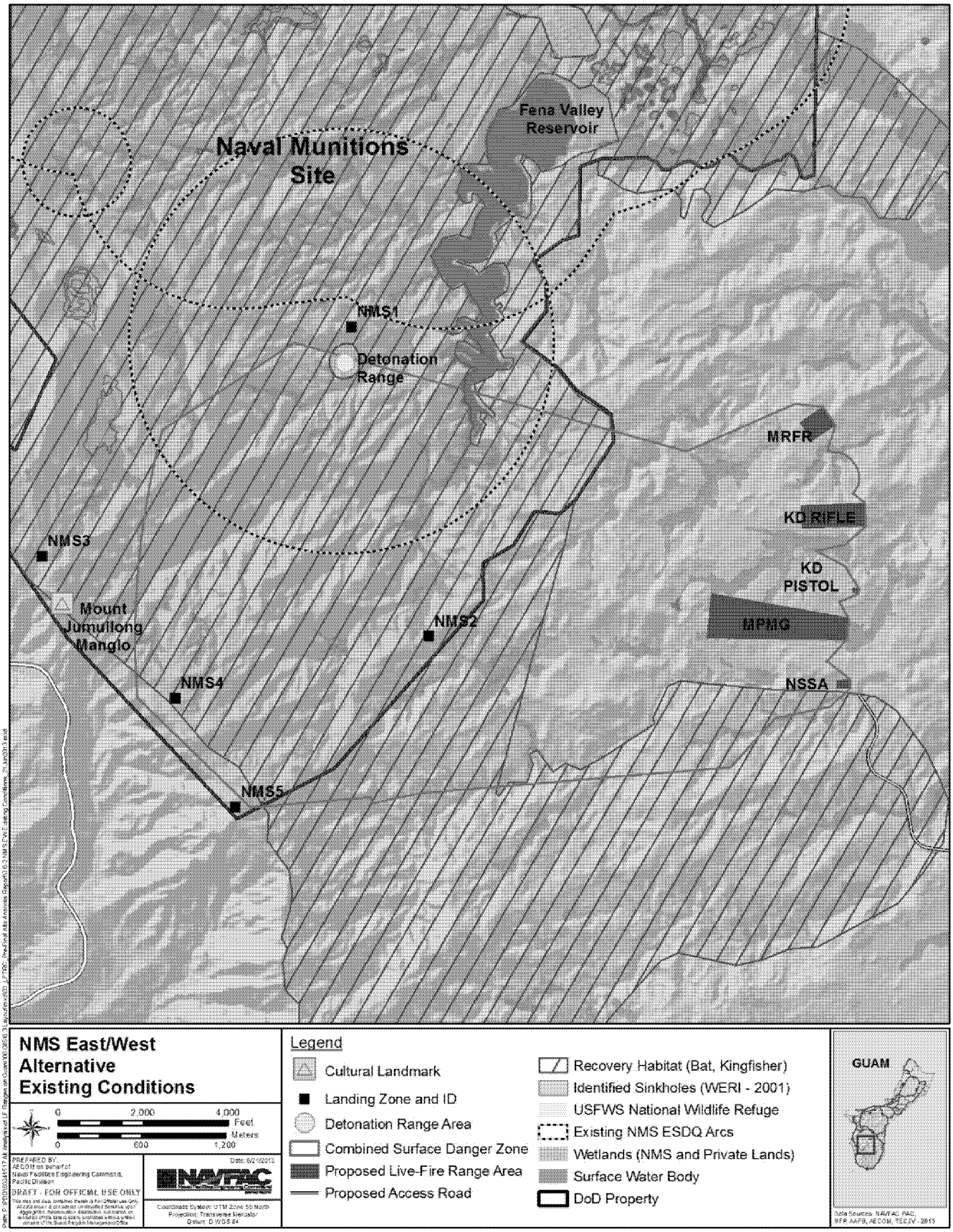


Figure 3.6-2: NMS East/West Alternative Existing Conditions

THIS PAGE INTENTIONALLY LEFT BLANK

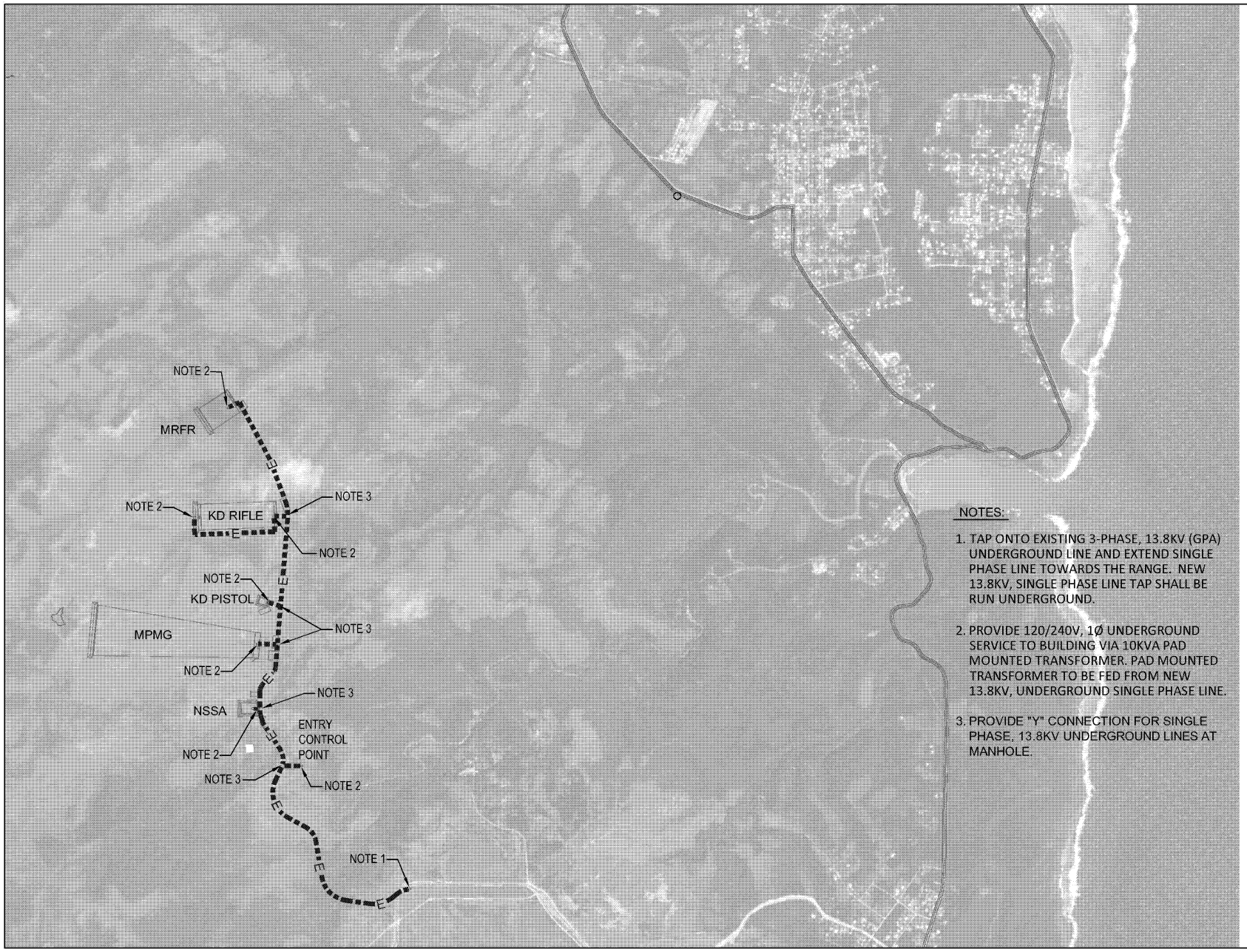


Figure 3.6-3
NMS East/West Alternative Electrical Plan

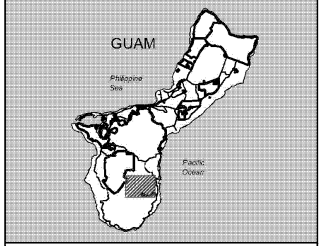
Legend

E NEW 13.8 KV, 1Ø UNDERGROUND LINE

NEW 120/240V 1Ø UNDERGROUND LINE FROM TRANSFORMER TO BUILDING

*All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 600 m 1,200 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

THIS PAGE INTENTIONALLY LEFT BLANK

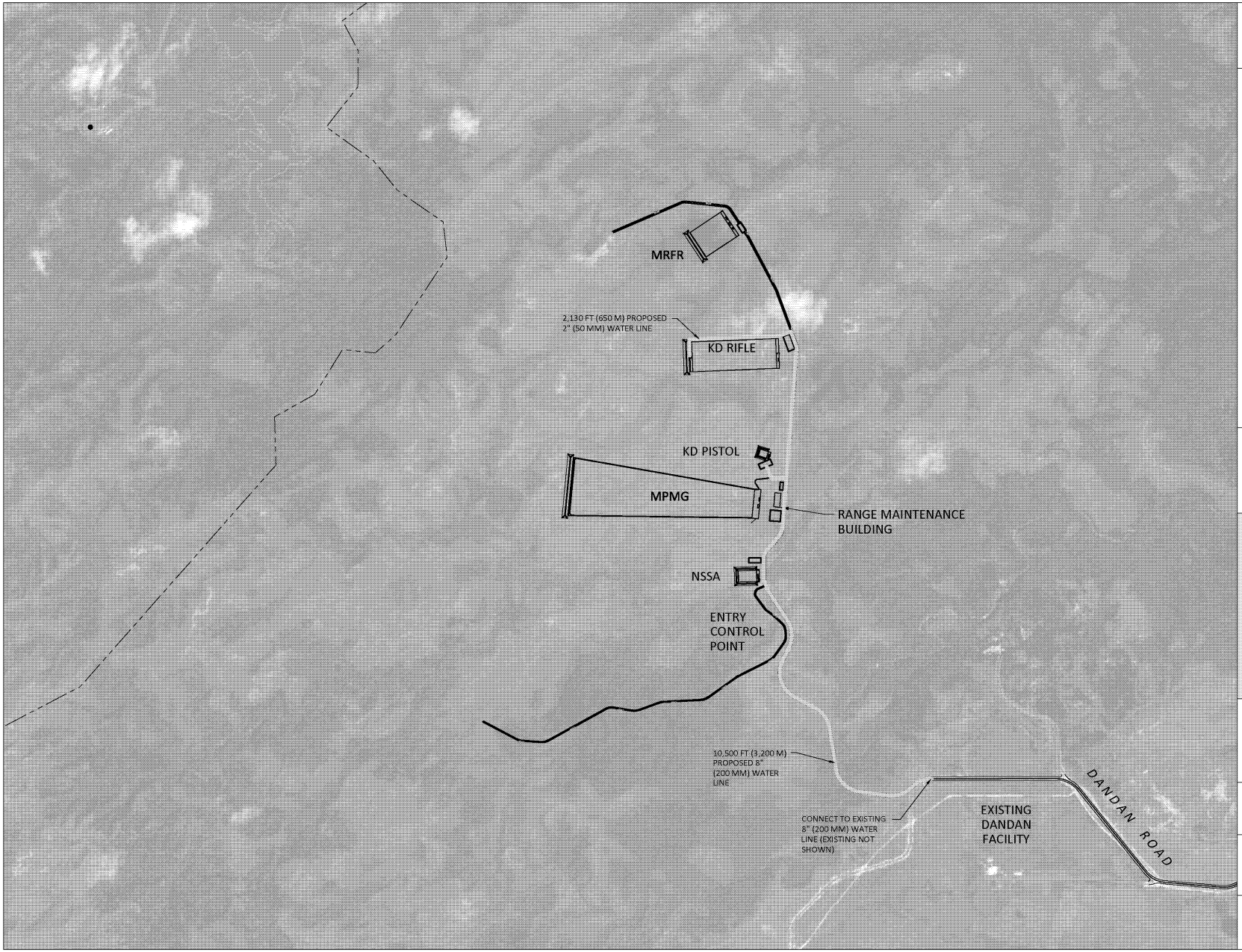


Figure 3.6-4
NMS East/West Alternative Water Plan

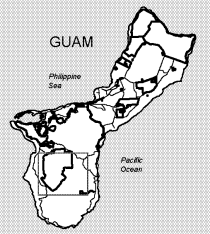
PROPOSED 8" (200 MM) WATER LINE

DOD PROPERTY LINE

Potable water service is required for the Range Maintenance Building, KD Pistol Range and KD Rifle Range only.

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 500 1000 m

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: June 2013

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

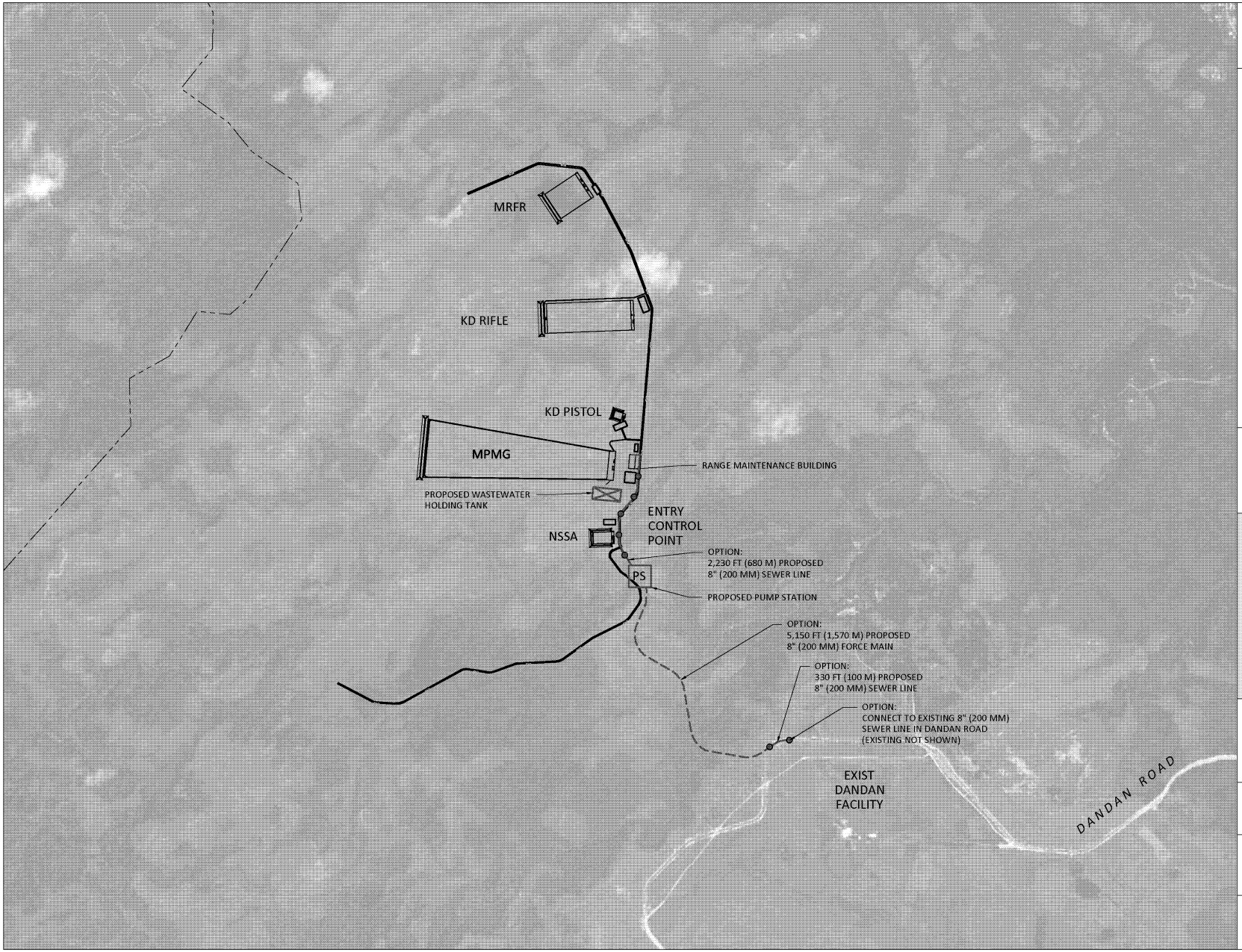


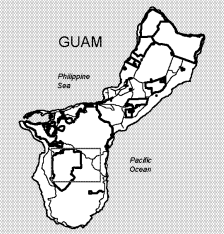
Figure 3.6-5
NMS East/West Alternative Wastewater Plan

- PROPOSED WASTEWATER HOLDING TANK
- PROPOSED 8" (200 MM) SEWER LINE
- PROPOSED 8" (200 MM) FORCE MAIN
- PROPOSED SEWER MANHOLE
- PROPOSED PUMP STATION
- DOD PROPERTY LINE

Sewer collection is required for the Range Maintenance Building only.

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: NAVFAC PAC, AAFB, TEC AECOM JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 500 1000 m

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command Pacific

Date: June 2013

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

THIS PAGE INTENTIONALLY LEFT BLANK

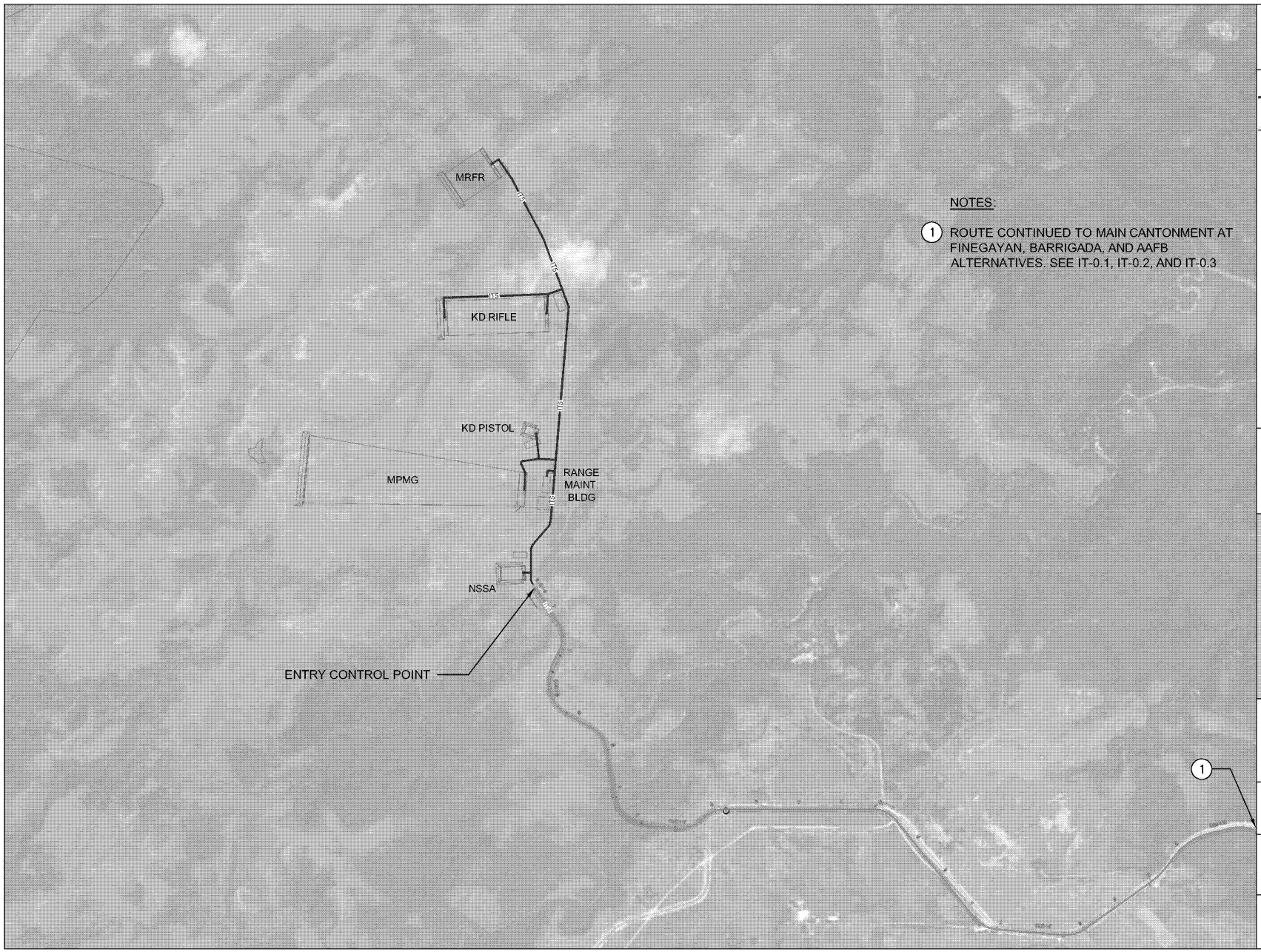


Figure 3.6-6
NMS East/West Alternative IT/COMM Plan

NOTES:

1. ROUTE CONTINUED TO MAIN CANTONMENT AT FINEGAYAN, BARRIGADA, AND AAFB ALTERNATIVES. SEE IT-0.1, IT-0.2, AND IT-0.3

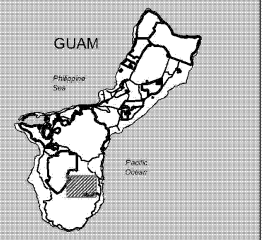
ITS — DISTRIBUTION TO LFTRC - DB1

ITB — USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

DB# DUCT BANK TYPE - SEE DUCT BANK AND CABLE SCHEDULE ON APPENDIX D FOR REQUIREMENTS

*All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 400 m 800 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

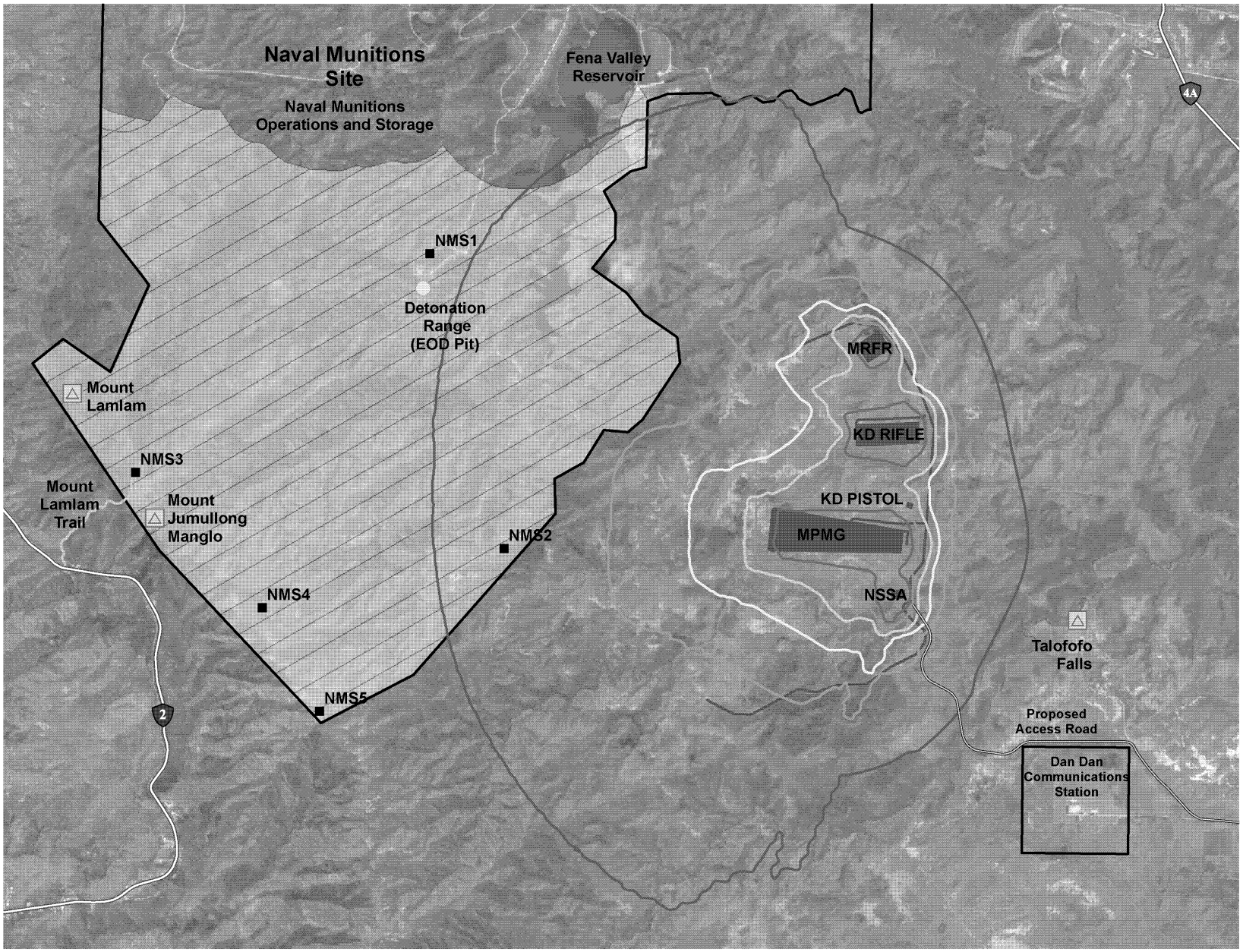


Figure 3.6-7
NMS East/West Alternative Operational Noise Assessment

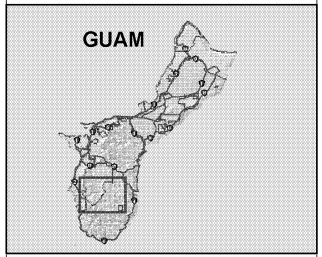
- Proposed Access Road

Small Caliber ADNL Noise Zone

- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (> 84 ADNL)
- Range Road
- Live-Fire Range Area
- Cultural Landmark
- Landing Zone and ID
- Detonation Range Area
- Existing Hiking Trail (Mt. Lamlam)
- Highway
- DoD Property
- Approved Non-Live-Fire Maneuver Training Area

* This map shows only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 1,500 3,000 Feet

0 400 800 Meters

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

Date: 6/24/2013

DRAFT - FOR OFFICIAL USE ONLY

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Date: 6/24/2013 Path: P:\PDI\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.6-7 NMS EW Small Caliber ADNL Noise_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

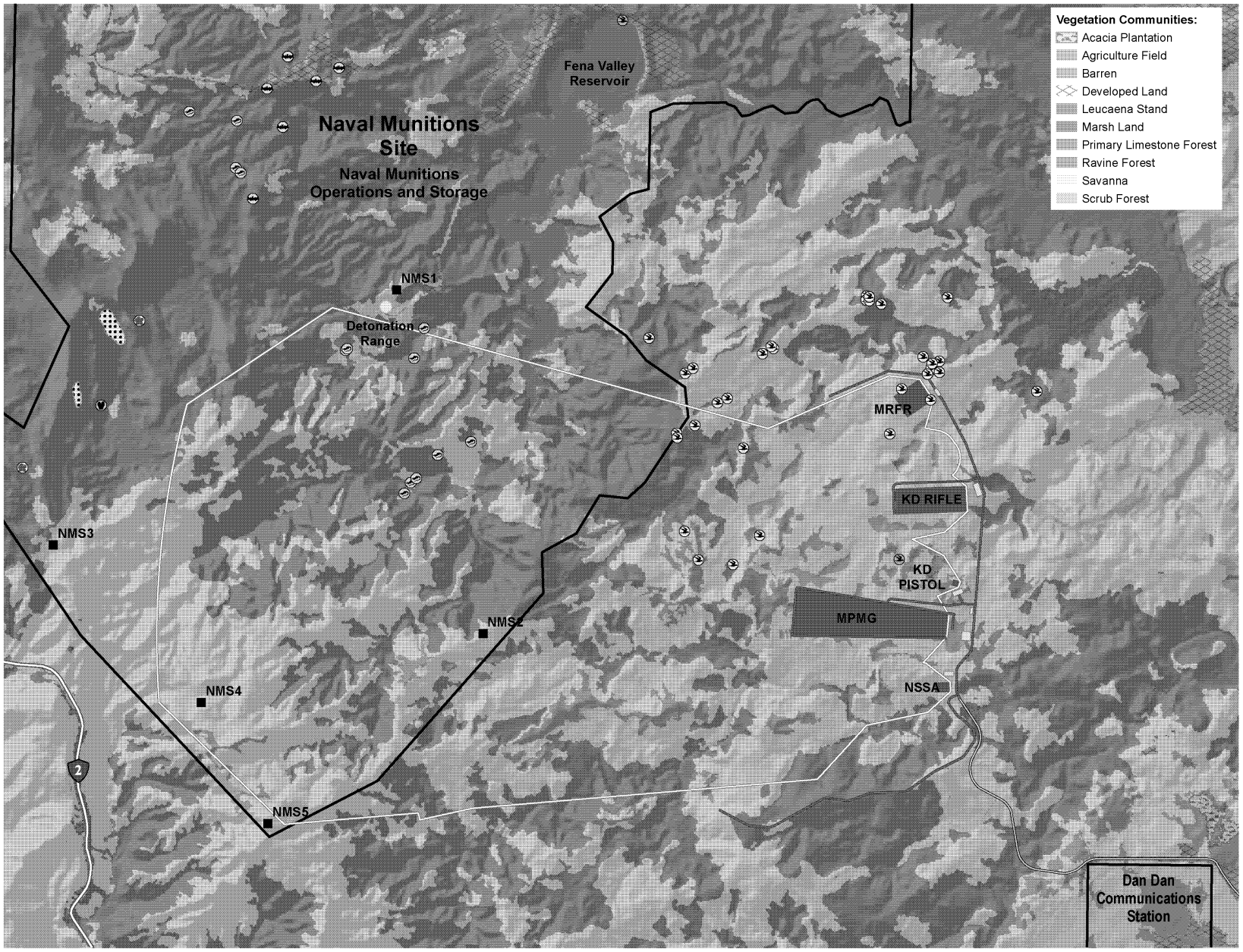


Figure 3.6-8
NMS East/West Alternative Vegetation and Special-Status Species

Special Status Species Occurrence

Fauna:
- Fruit Bat
- Moth Skink
- Pacific Slender-Toed Gecko
- Mariana Common Moorhen
- Mariana Swiftlet
- Mariana Eight-Spot Butterfly

Flora:
- *Heritiera longipetiolata*

Known Plant SOGCN Locations
- *Tabernaemontana rotensis*
- *Merrilliodendron megacarpum*
- Cycad Area
- Merrilliodendron
- Landing Zone and ID
- Proposed Access Road
- Range Road
- Parking Area
- NMS EW Combined SDZ
- Proposed Live-Fire Range Area
- Proposed Access Road
- DoD Property

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV

Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,000 4,000 Feet

0 500 1,000 Meters

PREPARED BY: Date: 6/24/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

DRAFT - FOR OFFICIAL USE ONLY

NAVFAC Naval Facilities Engineering Command Pacific

Date: 6/24/2013 Path: P:\PD\60624517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3.6-8 NMS EW Vegetation and SSS.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

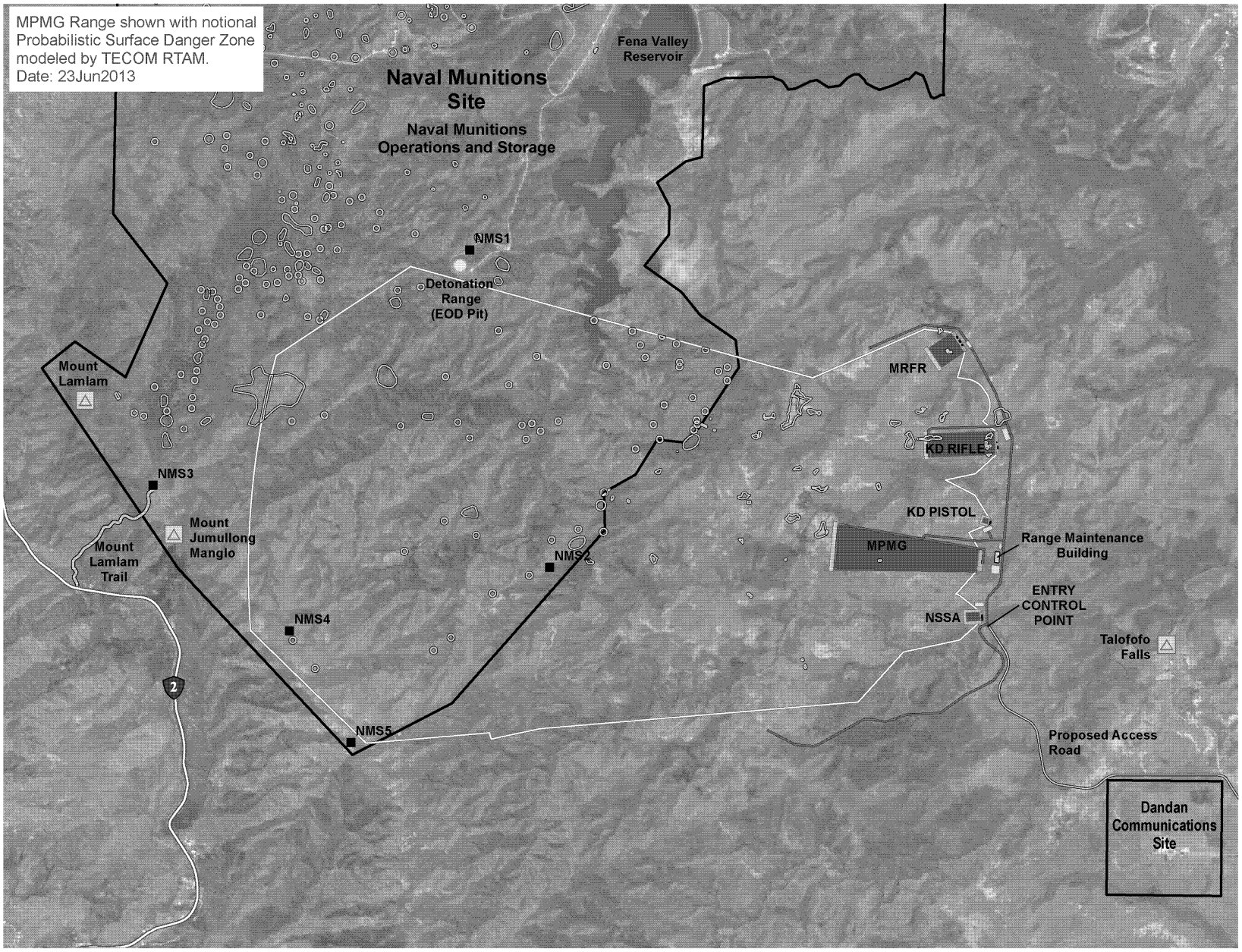
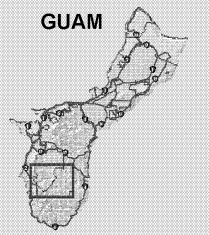


Figure 3.6-9
NMS East/West Alternative Cultural Resources

- Cultural Resource Area
- Proposed Access Road
- Range Road
- Parking Area
- Range Structures
- Berm Area
- Range Support Area
- NMS EW Combined SDZ
- Live-Fire Range Area
- Cultural Landmark
- Landing Zone and ID
- Hiking Trail (Mt. Lamlam)
- Highway
- DoD Property
- Wetlands (NMS and Private Lands)

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 2,500 5,000 Feet

0 600 1,200 Meters

PREPARED BY: Date: 6/23/2013
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

3.6.7 Range Transients

Proposed fencing on the southern, eastern, and northern sides of the eastern ranges would tie into restrictive terrain on the western side of the ranges to reduce the likelihood of unauthorized personnel entering the ranges and SDZ.

If approved by the FAA, the proposed Naval Munitions R-7202 RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live-fire training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live-fire training would cease until the aircraft is clear of the SDZ.

3.6.8 Operational Efficiency

The proposed NMS East/West alternative would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.

3.6.9 Orientation

The western orientation of the ranges would result in the loss of daylight training time in the late afternoon. The low sun, setting in the west, would affect the training audience's ability to engage targets and limit the late afternoon use of magnifying optics to avoid damage to eyesight.

3.6.10 Life Cycle Cost

The life cycle cost for the NMS East/West alternative is $445,329,000. See Table 2.6-1 for cost breakdown.

3.6.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7 and for the following packages:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges (funding in FY 2017).
- MPMG Range (funding in FY 2017).

For the NMS East/West alternative, the LFTRC would achieve the following IOCs:

- KD Rifle, KD Pistol, MRF, and NSSA Ranges November 2022
- MPMG Range December 2022

1 THIS PAGE INTENTIONALLY LEFT BLANK

3.7 HAND GRENADE RANGE

The Hand Grenade Range would be located at Andersen South for all of the LFTRC alternatives (Figure 3.7-1). This location would complement Marine non-live-fire training approved under the 2010 ROD. Similar to the alternatives analysis presented in this chapter, this section outlines the baseline conditions of the Hand Grenade Range, including natural and man-made constraints; proposed utilities and infrastructure improvements; consistency with Marine Corps guidance criteria; LCC; and construction phasing.

3.7.1 Existing Conditions and Constraints

Andersen South encompasses approximately 2,060 ac (834 ha). The property is inland of the Pacific Ocean coast (Figure 3.7-2), south of Route 1, and west of Route 15. The Andersen South area consists of open fields, wooded areas, and vacant houses that have been used for humanitarian operations, staging, bivouac, equipment inspection, and small unit tactics. MOUT training is conducted in abandoned housing areas. There are installation restoration (clean-up) sites and water production wells with wellhead clearance buffers in the area (Figure 3.7-2).

3.7.2 Land/Sea/Air Space Availability

The Hand Grenade Range would not require the acquisition of non-DoD land. The Hand Grenade Range would occupy approximately 0.9 ac (0.4 ha), and the SDZ would encompass approximately 30.7 ac (12.4 ha). In addition to the live-fire area, there would be a 1.0 acre (0.4 ha) non-live-fire training area developed adjacent to the range and outside of the SDZ. The training area would consist of a demonstration area with bleachers, an open practice throwing field with various targets and throwing positions, and a parking area. Inert practice hand grenades would be used at this training area to provide familiarization training prior to proceeding onto the live-fire Hand Grenade Range.

The vertical hazard associated with the Hand Grenade Range would extend 492 ft (150 m) AGL. MARFORPAC has proposed the Andersen South R-7202 (Plateau) RA to deconflict range operations with air traffic. Grading for the Hand Grenade Range is shown in Appendix B and summarized in Table 3.7-1.

Table 3.7-1: Grading Volumes for the Hand Grenade Range

Range Areas	Cut (m^3)	Fill (m^3)	Net (m^3)		Area of Disturbance (acres)
Hand Grenade Range	6,800	9,665	2,865	Fill	2

Source: Provided by AECOM.

3.7.3 Supporting Infrastructure

Access to the Hand Grenade Range would be from Route 1 through the existing Andersen South access road and along the existing internal road network in the Andersen South complex. A 0.12 mi (0.20 km) access road would be constructed to connect the Hand Grenade Range to the existing road network. The Hand Grenade Range would only require electrical utilities and IT/Comm services. These plans are shown in Figure 3.7-3 and Figure 3.7-4.

3.7.4 Land Use Compatibility

There would be no land use compatibility conflicts associated with the Hand Grenade Range.

An Operational Noise Assessment of the Hand Grenade Range, conducted by the USAPHC, concluded that the annual average noise levels from the proposed hand grenade activity would be compatible with the surrounding environment (Figure 3.7-5).

3.7.5 Environmental Considerations

No terrestrial biological or cultural resources would be impacted by the construction or operation of the Hand Grenade Range.

3.7.6 Public Access

Public access to Andersen South would be restricted by perimeter fencing and ECPs approved in the 2010 ROD. There would be no additional loss of public access caused by the Hand Grenade Range.

3.7.7 Range Transients

Perimeter fencing approved in the 2010 ROD would prevent unauthorized personnel from entering the Hand Grenade Range and SDZ.

If approved by the FAA, the proposed Andersen South R-7202 (Plateau) RA would be depicted on aeronautical charts, and it would be the responsibility of pilots to comply with the provisions of the RA. Compliance with the RA would allow uninterrupted live hand grenade training. Training units would maintain air sentries to visually observe for aircraft that may inadvertently violate the RA. If an aircraft inadvertently penetrates the RA, live hand grenade training would cease until the aircraft is clear of the SDZ.

3.7.8 Operational Efficiency

The proposed Hand Grenade Range location would facilitate like-training with the breacher house, shooter house, and MOUT Facility approved by the 2010 ROD.

3.7.9 Orientation

The Hand Grenade Range is not affected by range orientation.

3.7.10 Life Cycle Costs

The life cycle costs associated with the Hand Grenade Range are factored into the costs shown for each of the five range alternatives, as shown in Table 2.6-1.

3.7.11 Construction Phasing

Construction phasing timelines (Appendix A) were developed using the assumptions described in Section 2.7. The Hand Grenade Range would achieve IOC by June 2017.

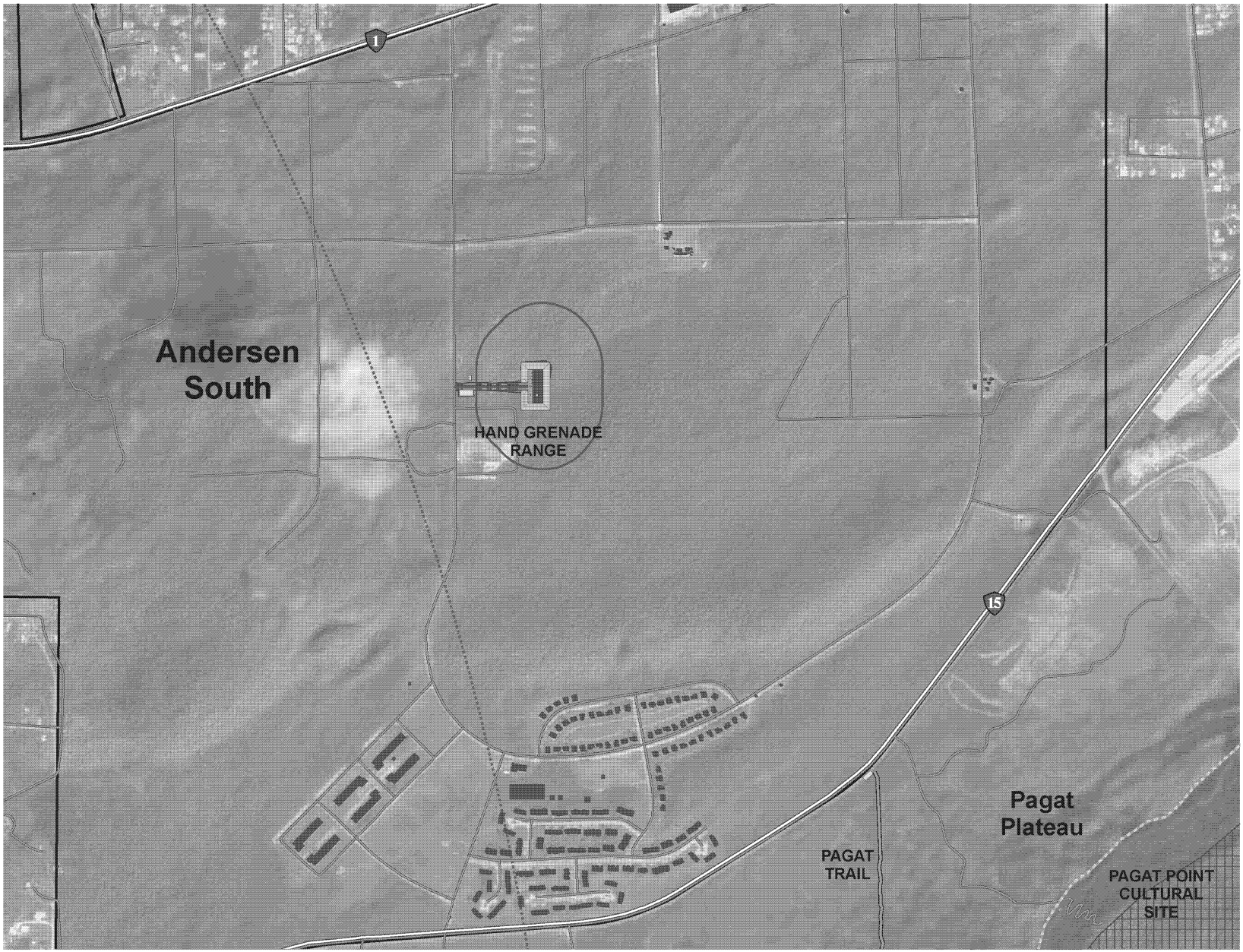
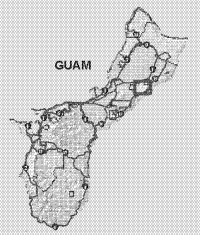


Figure 3.7-1
Hand Grenade Range

- Pagat Trail
- Proposed Range Structure
- Range Road
- Parking Area
- Berm Area
- Range Support Area
- Surface Danger Zone (SDZ)
- Live-Fire Range Area
- Existing Road
- Proposed Grading Contour (5 ft int)
- Existing Structure
- Class D Airspace
- DoD Property
- Pagat Point Cultural Site
- Pagat Village Cultural Site

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

Date: 6/24/2013

NAVFAC Naval Facilities Engineering Command Marianas Pacific

Date: 6/24/2013 Path: P:\PDI\60241517 Alt Analysis on LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3 7-1 Hand Grenade Range Stand Alone Alternative_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

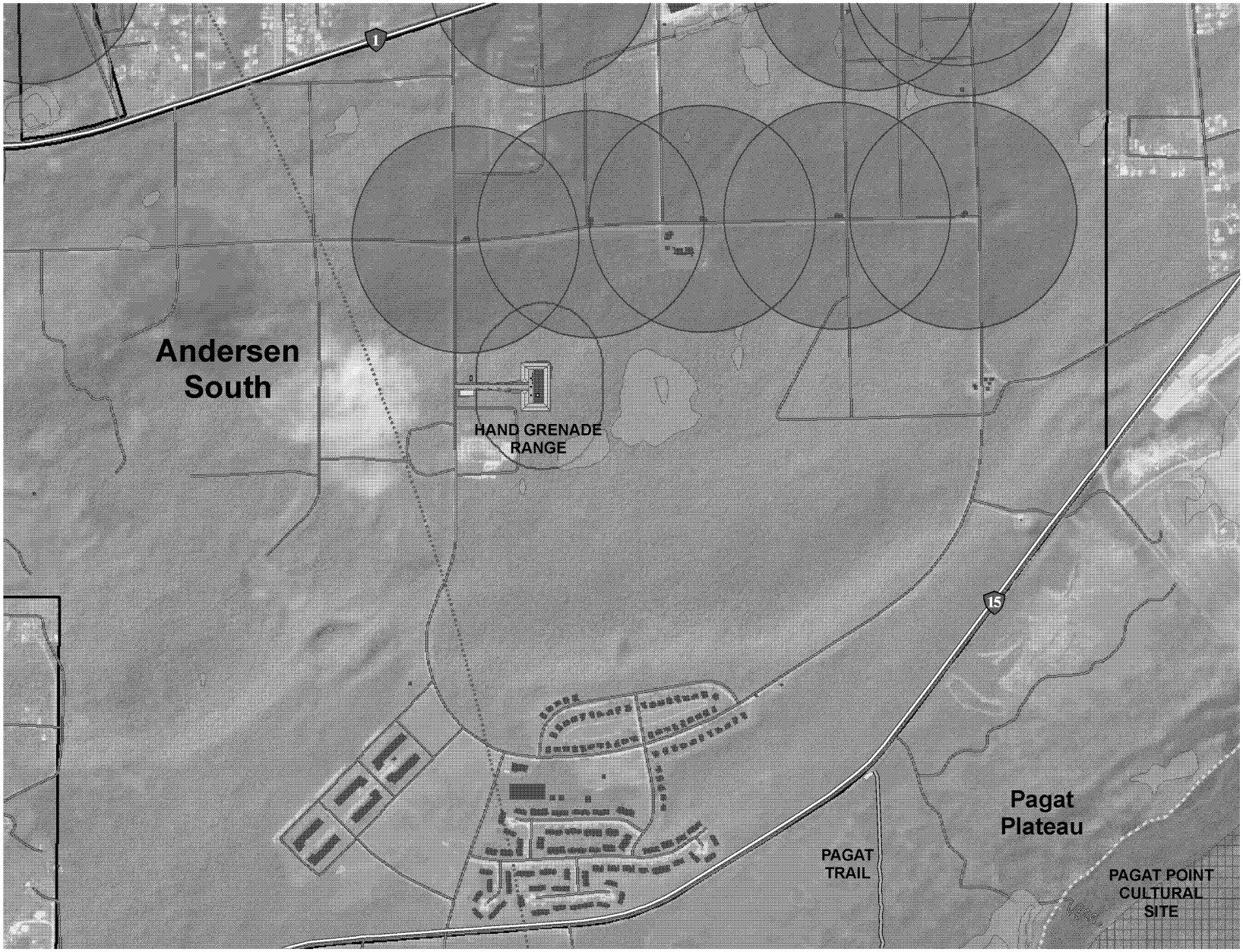
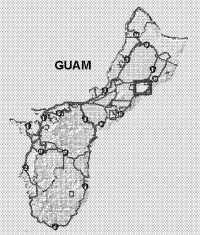


Figure 3.7-2
Hand Grenade Range
Existing Conditions

- Pagat Trail
- Water Well Locations
- Wellhead Protection Zone (1000 ft.)
- Identified Sinkholes (WERI - 2001)
- Proposed Range Structure
- Range Road
- Parking Area
- Berm Area
- Range Support Area
- Surface Danger Zone (SDZ)
- Proposed Live-Fire Range Area
- Existing Road
- Proposed Grading Contour (5 ft int)
- Existing Structure
- Class D Airspace
- DoD Property
- Pagat Point Cultural Site
- Pagat Village Cultural Site

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet

0 200 400 Meters

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

Date: 6/24/2013

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command NAVFAC PACIFIC

Date: 6/24/2013 Path: P:\PDI\60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layouts\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3 7-2 Hand Grenade Range Existing Conditions_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

NOTES

1. ELECTRICAL REQUIREMENTS FOR HAND GRENADE RANGE, TYPICAL TO ALL LFTRC ALTERNATIVES.
2. TAP ONTO EXISTING 3-PHASE, 13.8KV OVERHEAD LINE AND EXTEND SINGLE PHASE LINE AS SHOWN. NEW 13.8KV, SINGLE PHASE LINE TAP SHALL BE RUN UNDERGROUND.
3. 13.8 KV LINE TO PROVIDE 120/240V, 1Ø SERVICE TO BLDG VIA PAD MOUNTED 10 KVA TRANSFORMER.

Figure 3.7-3
Hand Grenade Range
Electrical Plan

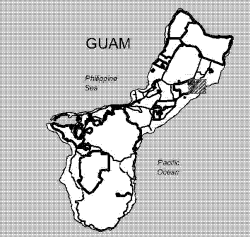
Legend

NEW 120/240V 1Ø UNDERGROUND LINE FROM PAD MOUNTED 10 KVA TRANSFORMER

E NEW 13.8 KV, 1Ø UNDERGROUND LINE

*All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 200 m 400 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

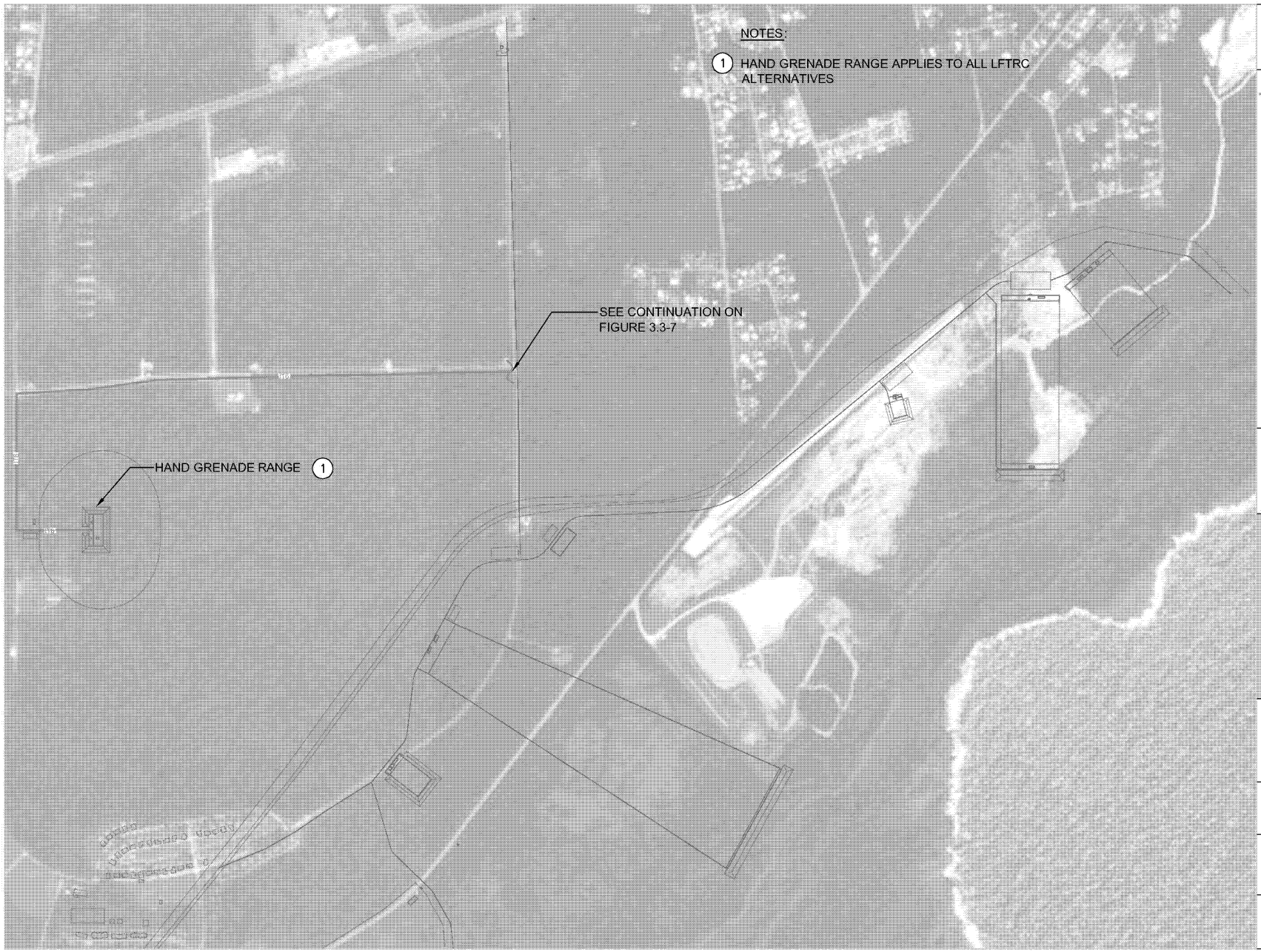


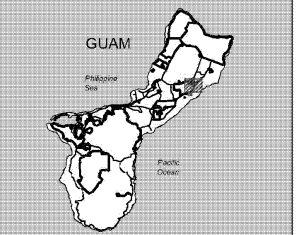
Figure 3.7-4
Hand Grenade Range
IT/COMM Plan

IT6 USMC IT/COMM FROM MAIN CANTONMENT TO LFTRC - DB1

DB# DUCT BANK TYPE - SEE DUCT BANK AND CABLE SCHEDULE ON APPENDIX D FOR REQUIREMENTS

"All information contained on this map is based on the best available data which was researched by the Government using good faith and diligent efforts. However, this map may NOT be used for determining any legally enforceable rights or property boundaries and shall not provide any rights to seek a legal claim against the Government."

Data Sources: JGPO 2013



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 200 m 400 m
Meters

PREPARED BY: Date: June 2013
AECOM on behalf of
Naval Facilities Engineering Command Pacific

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command

THIS PAGE INTENTIONALLY LEFT BLANK

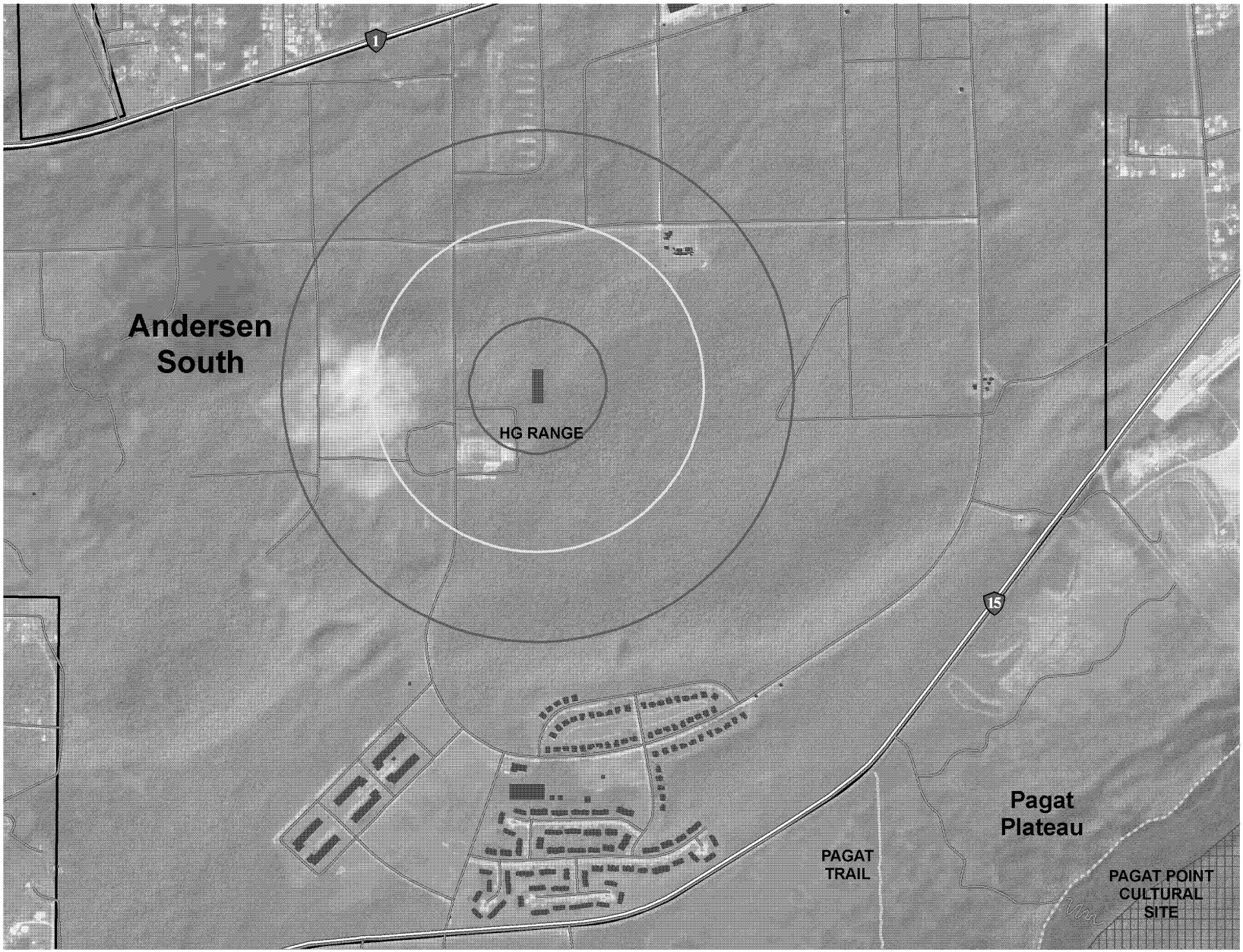
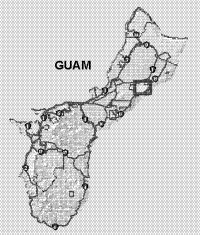


Figure 3.7-5
Hand Grenade Range
Operational Noise Assessment

CDNL Noise Zone
- Zone 3 (>70 db CDNL)
- Zone 2 (62-70 dB CDNL)
- LUPZ (57-62 dB CDNL)
- Pagat Trail
- Live-Fire Range Area
- Existing Road
- Existing Structure
- DoD Property
- Pagat Point Cultural Site
- Pagat Village Cultural Site

* This map shown only on-site impacted areas. Off-site required projects such as utilities and roads are not depicted on this map.

Data Sources: NAVFAC PAC, MFP, AAFB, TEC-AECOM Pacific JV



Coordinate System: UTM Zone 55 North
Projection: Transverse Mercator
Datum: D WGS 84

0 800 1,600 Feet
0 200 400 Meters

PREPARED BY:
AECOM on behalf of
Naval Facilities Engineering Command
Pacific Division

Date: 6/24/2013

DRAFT - FOR OFFICIAL USE ONLY

This map and data contained therein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without written consent of the Guam Program Management Office.

NAVFAC Naval Facilities Engineering Command

Date: 6/24/2013 Path: P:\PDD60241517 Alt Analysis of LF Ranges on Guam\06 GIS\6.3 Layout\mxd\03_LFTRC_Pre-Final Alts Analysis Report\3 7-5 HGR CDNL Noise Zones_21Jun2013.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

3.8 SUMMARY

Table 3.8-1 provides a summary of information about the various planning considerations addressed for each of the LFTRC alternatives. The intent of the summary table is to compare the various alternatives according to planning considerations. The table does not apply weighting, hierarchy, or classification to the information presented (i.e., it is not an analysis or screening tool). The planning considerations align with the information presented in Sections 3.2 through 3.7.

1 THIS PAGE INTENTIONALLY LEFT BLANK

Table 3.8-1: Summary of Planning Considerations for the LFTRC Alternatives

Planning Considerations	NWF Alternative	Route 15A Alternative	NMS North/South Alternative	NMS L-Shaped Alternative	NMS East/West Alternative	Hand Grenade Range
Land/Sea/Air Space Availability	Located on existing DoD-owned land at AAFB. SDZs would extend over the USFWS Ritidian Point Reserve, and extend over the Philippine Sea. No privately owned lands are encumbered by this alternative. Proposed the NWF R-7202 Restricted Area (RA) to deconflict range operations with air traffic.	Requires the acquisition of 872 ac (324 ha) of non-DoD land. SDZ would extend over approximately the Pagat Point Archaeological Reserve and extend over the Pacific Ocean. Would require the relocation of portions of Route 15. Proposed the Andersen South R-7202 (Plateau) RA to deconflict range operations with air traffic.	Requires the acquisition of approximately 252 ac (102 ha) of non-DoD land to the east of the NMS for the SDZ. Would require the relocation of 72 munitions storage magazines. Proposed the Naval Munitions R-7202 RA to deconflict range operations with air traffic.	Requires the acquisition of approximately 914 ac (370 ha) of non-DoD land. Would require the relocation of 66 munitions storage magazines. Proposed the Naval Munitions R-7202 RA to deconflict range operations with air traffic.	Requires the acquisition of approximately 1,894 ac (766 ha) of non-DoD land. Proposed the Naval Munitions R-7202 RA to deconflict range operations with air traffic.	Requires no non-DoD land. Proposed the Andersen South R-7202 (Plateau) RA to deconflict range operations with air traffic.
Supporting Infrastructure	Entry through the existing NWF Gate and via existing road network. Approximately 5.5 miles (mi) (8.4 km) of range roads would be improved /constructed to support internal LFTRC traffic. Utilities would be extended from existing lines.	Entry from Route 1 through the existing Andersen South access road. Underpass under the relocated Route 15 would allow access to the internal range road network. Alternate access would be via a second underpass under the Route 15 bypass from the Andersen South MOUT facility. Utilities would be extended from existing lines.	Entry through existing NMS Main Gate on Route 5. Existing NMS roadways would be used wherever possible, but a total of 3 mi (5 km) of new roadway would be required to support LFTRC operations. Utilities would be extended from existing lines.	Access to the MPMG Range and Range Maintenance Building would be from the existing NMS Main Gate on Route 5. 4 mi (7 km) of new/improved roadway is required to support range operations on the NMS. Access to the ranges to the east of the NMS would be via an access road connecting to Dandan Road. Utilities would be extended along the access road from existing lines along Dandan Road.	Access from new road connecting to Dandan Road. 5 mi (9 km) of roadway would be constructed to support training. Utilities would be extended along the access road from existing lines along Dandan Road.	Access to the Hand Grenade Range would be from Route 1 through the existing Andersen South access road and along the existing internal road network in the Andersen South complex. Would only require electrical utilities and IT/Comm services that would be extended from existing lines.
Land Use Compatibility	Requires relocation of the existing USFWS Ritidian Point Unit Administration Building and Visitors' Center and reduces the Wildlife Unit area that can be accessed by the public. Impacts to existing Air Force air/ground operations at NWF and AAFB air space. No noise-sensitive land uses created by range noise.	Route 15 would need to be re-routed. Would displace the Guam International Raceway and a quarry operation adjacent to the raceway. Approximately 83 ac (34 ha) of the Pagat Point archaeological site would be encumbered by the LFTRC composite SDZ. Noise impacts to approximately 10 residential properties.	Would displace 72 existing munitions storage magazines. SDZ would encumber the existing breacher house, sniper range, and the Ordnance Annex Detonation Range. SDZ would also encumber the NMS 1 Landing Zone and 1,630 ac (660 ha) of the Non-Live-Fire Maneuver area identified in the Guam Relocation FEIS. No noise-sensitive land uses created by range noise.	Would displace 66 existing munitions storage magazines. MPMG SDZ would encumber the existing breacher house, sniper range, and the Ordnance Annex Detonation Range. SDZ would also encumber the NMS 1 and 2 Landing Zones, and 2,303 ac (932 ha) of the Non-Live-Fire Maneuver area identified in the Guam Relocation FEIS. No noise-sensitive land uses created by range noise.	SDZ would encumber the NMS 2 and 4 Landing Zones; and 1,700 ac (688 ha) of the Non-Live -Fire Maneuver area identified in the 2010 Guam Relocation FEIS. No noise-sensitive land uses created by range noise.	No land use compatibility issues. No noise-sensitive land uses created by range noise.
Environmental Considerations	Requires clearing of primary limestone forest and removal of areas of Overlay Refuge. Impacts conservation efforts in Overlay Refuge Clears suitable Mariana Fruit Bat habitat Noise/activity impacts to Mariana Fruit Bat Potential impact to 21 NRHP eligible sites Potential indirect impacts to as many as 38 NRHP eligible sites	Requires clearing of primary and secondary limestone forest. Possible mortality to Mariana eight-spot butterfly Clears suitable Mariana Fruit Bat habitat Potential direct impacts to 3 historic properties during construction. Potential impacts to four historic properties during operations.	Requires clearing of primary limestone forest, ravine forest, and forested wetland. Removes of large areas of the Overlay Refuge. rtality of Pacific slender-toed gecko at MPMG. Clears suitable Mariana Fruit Bat and Mariana Swiftlet habitat. s of one pond used by Mariana common moorhen. Would potentially result in direct impacts to 15 NRHP-eligible archaeological sites. Indirect impacts to as many as 215 archaeological sites and two structures could occur during operations.	Requires clearing of primary limestone forest, ravine forest, and forested wetland. Removes of large areas of the Overlay Refuge. rtality of Pacific slender-toed gecko at MPMG. Clears suitable Mariana Fruit Bat and Mariana Swiftlet habitat. s of one pond used by Mariana common moorhen. Potential impacts to Bolanos Conservation Area. Would potentially result in direct impacts on 11 NRHP-eligible archaeological sites. Indirect impacts to up to 264 archaeological sites and five structures could occur during operations.	Requires clearing of ravine forest, herbaceous wetlands, and areas of primary limestone forest. Clears suitable Mariana Swiftlet habitat. Potential impacts to Bolanos Conservation Area. Would potentially result in direct impacts on nine historic properties (archaeological sites). Indirect impacts on as many as 98 historic properties could occur during operations.	No terrestrial biological or cultural resources would be impacted by the construction or operation of the Hand Grenade Range.
Public Access	Public access would be prohibited to the portions of the Ritidian Point Unit and nearshore waters encumbered by the SDZ when the LFTRC ranges are active.	Would allow unimpeded (24 hours per day/7 days a week) access to the Pagat Trail and the Pagat Village archaeological site. Public access to the Pagat Point archaeological site and nearshore waters encumbered by the SDZ would be prohibited when the LFTRC ranges are active.	Public access to the NMS is currently restricted. The proposed LFTRC would not cause any additional loss of public access. There would be no impacts on the Mt. Lamlam Trail under this alternative.	Public access to the NMS is currently restricted. Public access would also be restricted from 914 ac (370 ha) of the eastern ranges and their associated SDZs. There would be no impacts on the Mt. Lamlam Trail under this alternative.	Public access to the NMS is currently restricted. Public access would also be restricted from the 1,894 ac (766 ha) of the ranges and their associated SDZs to the east of the NMS. There would be no impacts on the Mt. Lamlam Trail under this alternative.	Public access to Andersen South would be restricted by perimeter fencing and ECPs approved in the 2010 ROD. There would be no additional loss of public access caused by the Hand Grenade Range.
Range Transients	The existing controlled access to AAFB and proposed fencing on Ritidian Point would prevent unauthorized persons from entering the SDZ. Two proposed Range Observation Towers would provide surveillance of the nearshore SDZ. Proposed the NWF R-7202 RA would allow uninterrupted live-fire training.	Proposed fencing and the ECP would prevent unauthorized persons from entering the LFTRC and the SDZ. Two proposed Range Observation Towers would provide surveillance of the nearshore SDZ. Proposed Andersen South R-7202 (Plateau) RA would allow uninterrupted live-fire training.	The existing fencing and ECP would prevent unauthorized persons from entering the LFTRC and the SDZ through the NMS. The extremely steep and heavily vegetated terrain on the eastern, southern, and western boundaries of the NMS would reduce the likelihood of unauthorized access by personnel. Proposed Naval Munitions R-7202 RA would allow uninterrupted live-fire training.	The existing fencing and ECP would prevent unauthorized persons from entering the LFTRC and the SDZ through the NMS. The extremely steep and heavily vegetated terrain on the eastern, southern, and western boundaries of the NMS reduces the likelihood of unauthorized personnel access. Proposed fencing on the southern, eastern, and northern sides of the eastern ranges would tie into restrictive terrain on the western side of the ranges to reduce the likelihood of unauthorized personnel entering the ranges and SDZ. Proposed Naval Munitions R-7202 RA would allow uninterrupted live-fire training.	Proposed fencing on the southern, eastern, and northern sides of the eastern ranges would tie into restrictive terrain on the western side of the ranges to reduce the likelihood of unauthorized personnel entering the ranges and SDZ. Proposed Naval Munitions R-7202 RA would allow uninterrupted live-fire training.	Perimeter fencing approved in the 2010 ROD would prevent unauthorized personnel from entering the Hand Grenade Range and SDZ. Proposed Andersen South R-7202 (Plateau) RA would allow uninterrupted live-fire training.

THIS PAGE INTENTIONALLY LEFT BLANK

Table 3.8-1: Summary of Planning Considerations for the LFTRC Alternatives (cont'd)

Planning Considerations	NWF Alternative	Route 15A Alternative	NMS North/South Alternative	NMS L-Shaped Alternative	NMS East/West Alternative	Hand Grenade Range
Operational Efficiency	Would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.	Would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC. Location adjacent to the Andersen South Training Complex would facilitate transitions from live-fire to non-live-fire training and provide maximum efficiency for range maintenance and management.	Would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.	Would locate ranges and facilities in two locations. This would reduce the efficiency in range maintenance and management.	Would locate all facilities in a single location, which would maximize the operational efficiency of the LFTRC.	Would facilitate like-training with the breacher house, shooter house, and MOUT Facility approved by the 2010 ROD.
Orientation	Generally northern orientation of the ranges would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun.	Generally southeastern orientation of the ranges would cause a loss of daylight training in the early morning hours. The low sun rising in the east would affect the training audience's ability to engage targets on the southeast-facing ranges and would limit early morning use of magnifying optics to avoid damage to eyesight.	Generally southern orientation of the ranges would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun.	Generally southern orientation of the MPMG Range would provide maximum available daytime use because personnel would not have to fire into the rising or setting sun. The western orientation of the remaining ranges would result in the loss of daylight training time in the late afternoon. The low sun, setting in the west, would affect the training audience's ability to engage targets and limit the late afternoon use of magnifying optics to avoid damage to eyesight.	The western orientation of the ranges would result in the loss of daylight training time in the late afternoon. The low sun, setting in the west, would affect the training audience's ability to engage targets and limit the late afternoon use of magnifying optics to avoid damage to eyesight.	Not affected by range orientation.
Life Cycle Cost	$462,143,000	$609,246,000	$696,035,000	$616,174,000	$445,329,000	Life cycle costs associated with the Hand Grenade Range are factored into the costs shown for each of the five range alternatives
Construction Phasing	MPMG IOC – May 2019 Small Arms Ranges IOC – Oct 2018	MPMG IOC – Mar 2020 Small Arms Ranges IOC – Jan 2020	MPMG IOC – Jul 2019 Small Arms Ranges IOC – Jul 2019	MPMG IOC – Nov 2019 Small Arms Ranges IOC – Apr 2024	MPMG IOC – Dec 2022 Small Arms Ranges IOC – Nov 2022	IOC – June 2017

THIS PAGE INTENTIONALLY LEFT BLANK

4 REFERENCES

33 CFR (Code of Federal Regulations) 334. 1985. *Danger Zone and Restricted Area Regulations*. Available at URL = http://www.gpo.gov/fdsys/pkg/CFR-2011-title33-vol3/pdf/CFR-2011-title33-vol3-part334.pdf.

AECOM. 2013. *Ammunition Storage Relocation Assessment in Support of the Guam LFTRC Alternatives Analysis, Draft.* January.

DoD (Department of Defense). 2005. *Unified Facilities Criteria (UFC), Water Supply Systems*. UFC 3-230-19N. 8 June.

DoD (Department of Defense). 2013a. *Unified Facilities Criteria (UFC), Water Treatment*. UFC-3-230-03. 1 November.

DoD (Department of Defense). 2013b. *Unified Facilities Criteria (UFC), Fire Protection Engineering for Facilities*. UFC-3-600-01. Includes Change 3. 1 March.

JGPO (Joint Guam Program Office). 2010. *Final Environmental Impact Statement, Guam and CNMI Military Relocation.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. July.

Marine Corps (United States Marine Corps). 2004. *Marine Corps Ground Range Certification and Recertification Program*. Washington, 28 June.

Marine Corps. 2007. *Marine Corps Combat Marksmanship Programs*. MCO 3574.2K. 1 August.

Marine Corps. 2008. *Range Air Installations Compatible Use Zones (RAICUZ) Program*. MCO 3550.11/OPNAVINST 3550.1A. Washington. 28 January.

Marine Corps. 2012. *Range Safety*. MCO 3570.1C. Washington. 30 January.

NAVFACPAC (Naval Facilities Engineering Command Pacific). 2013a. *Guam and CNMI Military Relocation 2012 Roadmap Adjustments, Planning Report, Draft.* Pre-Final, dated June 2013.

NAVFACPAC (Naval Facilities Engineering Command Pacific). 2013b. *Life Cycle Cost Analysis Marine Corps Relocation, Guam.* Pre-Final, dated June 2013.

WERI (Water and Environmental Research Institute). 2001. Karst Features of Guam, Mariana Islands. Technical Report No. 104. Report dated March 2004; data cited from 2001.

1 THIS PAGE INTENTIONALLY LEFT BLANK

Appendix A: Construction Phasing Timelines

THIS PAGE INTENTIONALLY LEFT BLANK

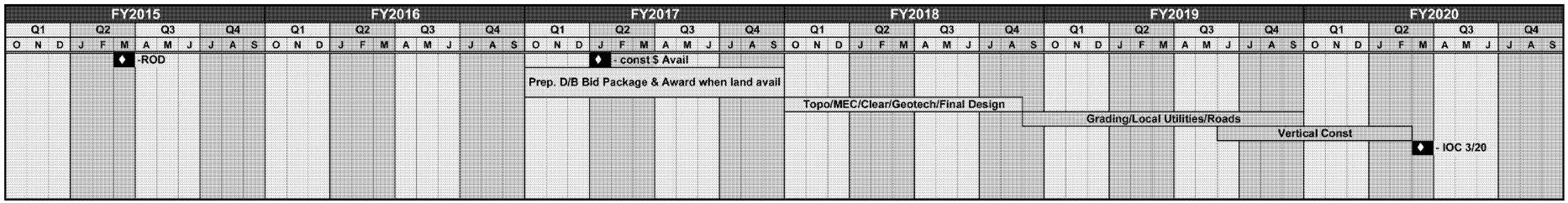


Figure A-1: Construction Phasing Timeline for the NWF Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

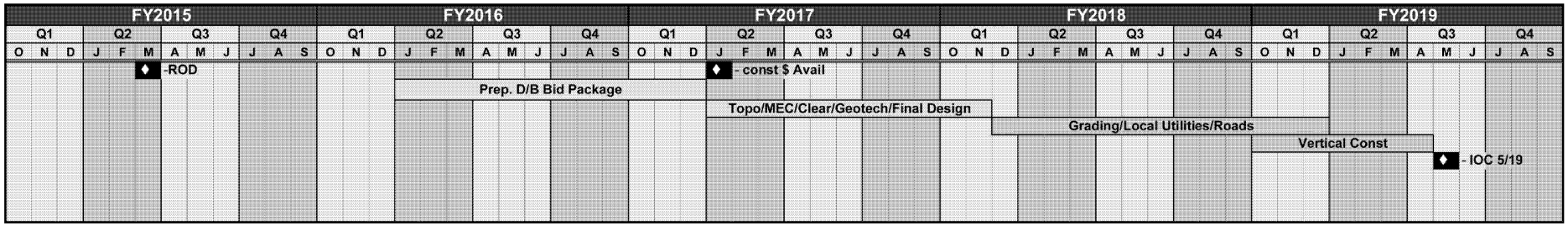


Figure A-2: Construction Phasing Timeline for the NWF Alternative: MPMP Range

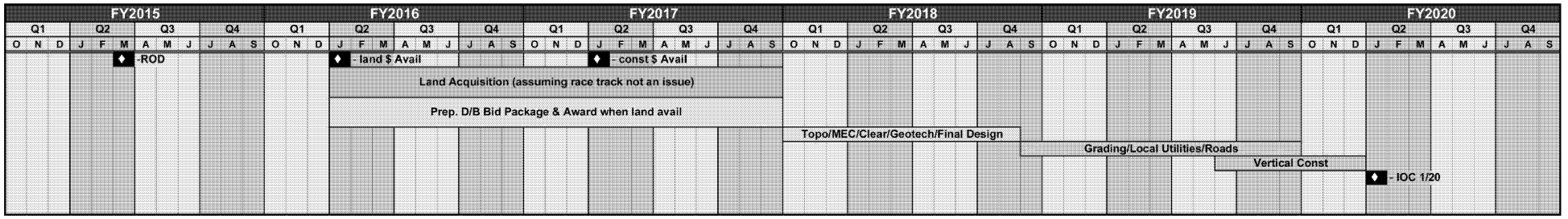


Figure A-3: Construction Phasing Timeline for the RT 15A Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

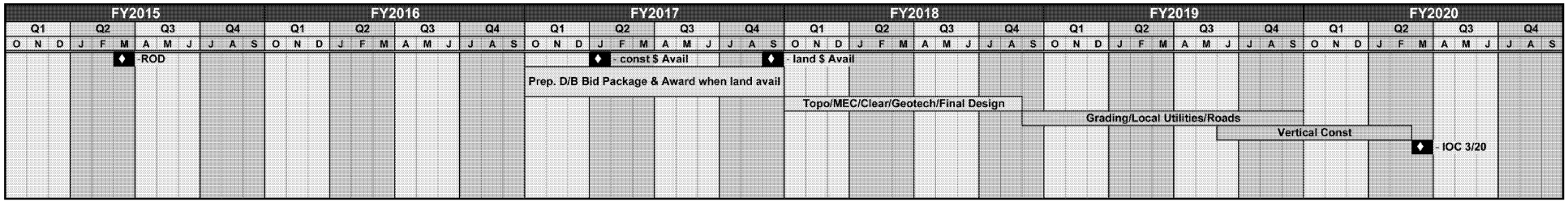


Figure A-4: Construction Phasing Timeline for the RT 15A Alternative: MPMP Range

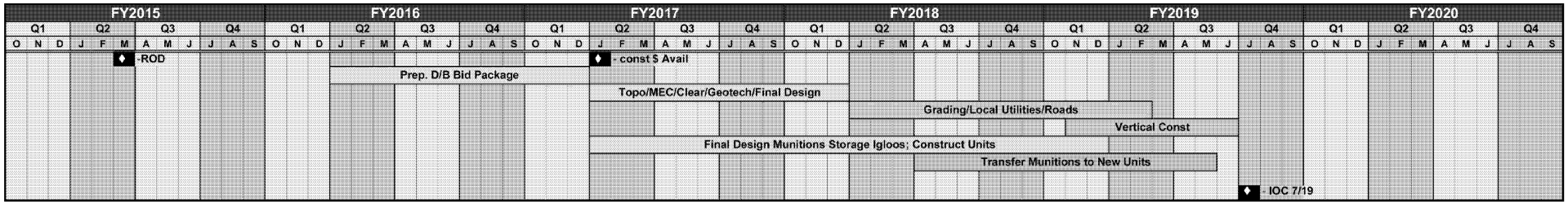


Figure A-5: Construction Phasing Timeline for the NMS North/South Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

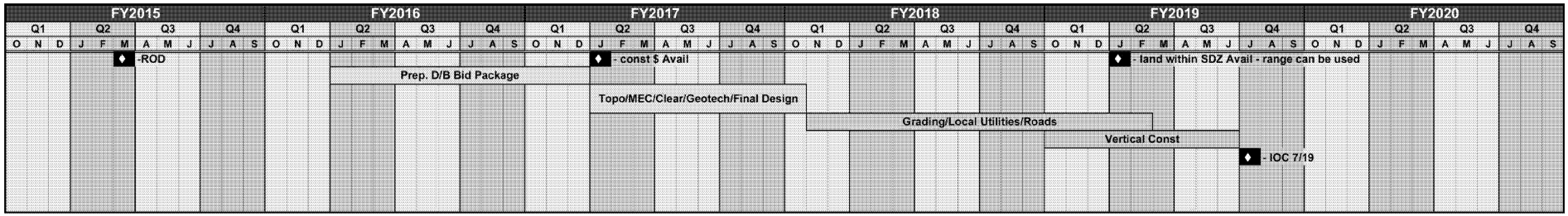


Figure A-6: Construction Phasing Timeline for the NMS North/South Alternative: MPMP Range

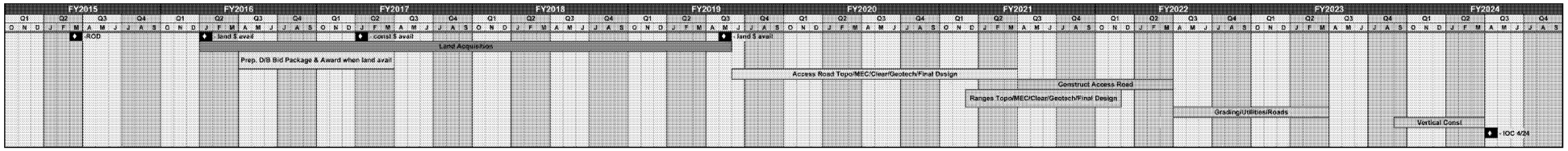


Figure A-7: Construction Phasing Timeline for the NMS L-Shaped Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

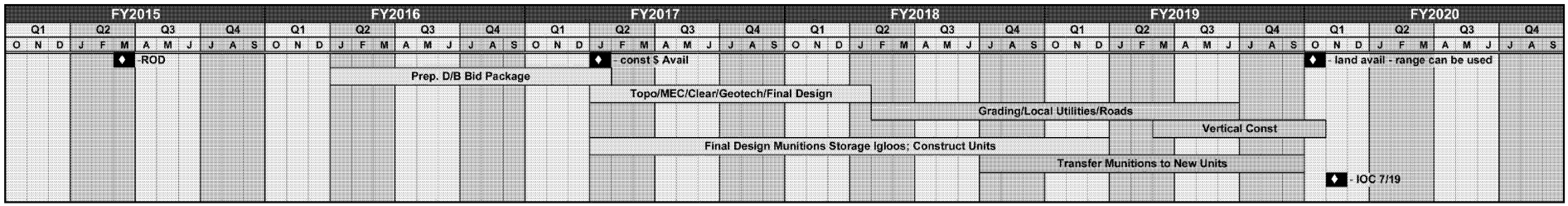


Figure A-8: Construction Phasing Timeline for the NMS L-Shaped Alternative: MPMP Range

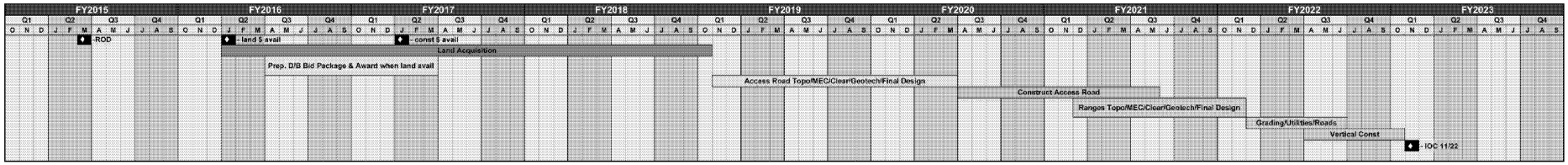


Figure A-9: Construction Phasing Timeline for the NMS East/West Alternative: KD Rifle, KD Pistol, MRF, and NSSA Ranges

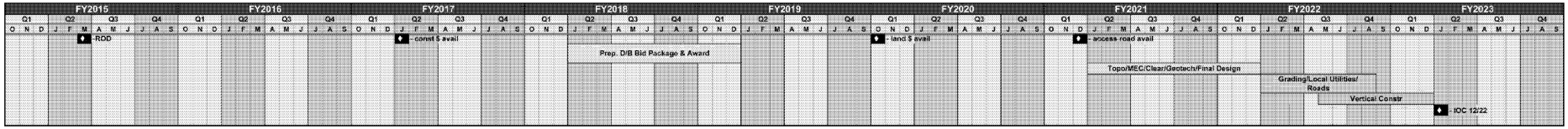


Figure A-10: Construction Phasing Timeline for the NMS East/West Alternative: MPMP Range

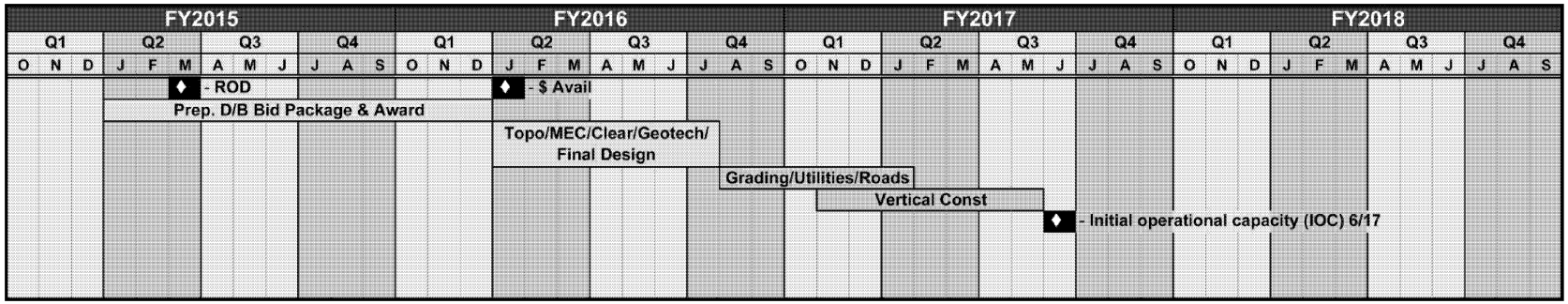


Figure A-11: Construction Phasing Timeline for the Hand Grenade Range

Appendix B: Grading Plans

(Provided Digitally Under Separate Cover)

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

JOINT GUAM PROGRAM OFFICE

NAVFAC